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ABSTRACT

This project first identified the duties and tasks required of an entry-level auto mechanic (AM) and an auto body worker (ABW), using a modified DACUM (Developing a Curriculum) occupational analysis process. In this process, a panel of local, expert workers determined the essential duties and tasks of their occupations. Next, the panel identified specific basic skills necessary to accomplish each task. Based on the results of those skills analyses and the application of general criteria for instructional resource and assessment review, lists were drawn up of the most relevant basic skills instructional and assessment resources available through commercial publishers and vocational research and curriculum development centers. Recommendations were made for selecting instructional materials and assessment instruments in the areas of listening, writing, reading, speaking, and mathematics skills suited to auto mechanics and auto body workers. A list of the instructional and assessment instruments reviewed makes up the bulk of this document. For each instructional resource, the title, publisher, copyright date, stated objectives, reading level, type of binding, and cost are given along with the opinion of the reviewers. Vocational assessment instruments are described according to their title, skills they appear to assess, item orientation, level of difficulty, number of items, publisher description, cost, copyright dates, type of scoring, type of administration, time required, reporting format, reliability, and validity. Appendixes to the document contain addresses of publishers and research institutes, task lists of skills used by AMs and ABWs, and samples of on-the-job reading and writing materials used by these workers. (Author/KC)

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

# LINKING BASIC SKILLS TO ENTRY-LEVEL AUTO MECHANIC & AUTO BODY WORKER TASKS

- INSTRUCTIONAL RESOURCES
- ASSESSMENTS

**Salt Lake Skills Center**
**a division of Utah Technical College**
**431 South 600 East**
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This project took place between the months of September, 1982 and June, 1983. The report was prepared for vocational administrators, instructors, counselors and curricula designers. Copies of this report can be obtained from the Utah State Office of Education, 250 East 500 South, Salt Lake City, Utah, 84111.

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# Section 1

# Introduction

# Abstract

The basic skills of reading, writing, listening, speaking and mathematics are an integral part of the duties and tasks of many occupations. However, more precise information about which of those basic skills are required in a given occupation is needed. Vocational administrators, curricula developers, counselors, and instructors require specific basic skills information in order to find and select the most occupationally relevant basic skills instructional materials and assessment instruments. They can then more easily determine entry and exit criteria for vocational training programs. They can also instruct in the basic skills more practically and effectively prior to or during vocational training.

This project first identified the duties and tasks required of an entry-level AM and ABW using a modified DACUM (Developing a Curriculum) occupational analysis process. In this process, a panel of local, expert workers determined the essential duties and tasks of their occupations. Next, the panel identified specific basic skills necessary to accomplish each task.

Finally, based on the results of those skills analyses and the application of general criteria for instructional resource and assessment review, lists were formulated of the most relevant basic skills instructional and assessment resources available. The report ends with final conclusions and recommendations.

# Terminology

| | |
|---|---|
| Basic Skills (basic educational skills) | Fundamental reading, writing, listening, speaking and mathematics proficiencies |
| Basic Communication Skills | Fundamental reading, writing listening and speaking abilities necessary to send or receive a message |
| Basic Skills Taxonomy | Categories of a given basic skill that reflect levels of skill difficulty |
| Auto Mechanic (AM) or Auto Mechanics (AM's) throughout this report | A person or persons who repair and overhaul automotive vehicles |
| Auto Body Worker (ABW) or Auto Body Workers (ABW's) throughout this report | A person or persons who repair damaged bodies and body parts of automotive vehicles according to repair manuals, using hand tools and power tools |
| Task | A measurable element of work usually performed by a single worker (example: adjust valves) |
| Duty | A category of work which consists of related tasks (example: Perform engine overhaul activities) |
| Occupation | The overall category into which particular duties are categorized (example: Auto Mechanics) |
| Entry-level AM or ABW | A person with specific vocational training, but no experience, who obtains his/her first position in the occupation |
| Specialty Area | The area of an occupation in which a worker has more training and knowledge than in other areas of the occupation (example: within Auto Mechanics, Transmission is a specialty area) |

## TERMINOLOGY (Cont'd)

| | |
|---|---|
| Occupational Task Analysis | A determination of the duties specific to a given occupation and the tasks that comprise those duties |
| Vocationally General | Applicable to any occupation |
| Vocationally Specific | In this report, applicable to the particular occupation of auto mechanics and/or auto body |
| Vocationally Specific basic skills | Fundamental reading, writing, listening, speaking and mathematics abilities required to perform auto mechanics and auto body duties and tasks |
| Life Skills | Fundamental abilities which enable one to cope with the everyday demands of adult existence |
| Classroom Skills | Those competencies and abilities which enable a student to function satisfactorily in a traditional educational setting |

# Background and Rationale

## BACKGROUND

A study published by the National Institute of Vocational Education illustrates the point that there is a need to define occupationally specific basic skill proficiencies.

> It would be most useful to know the level of basic skill attainment of students in different vocational programs so that the gap, if any, between proficiency of students who are preparing for particular occupations and demands placed on workers in those occupations can be identified and closed.[1]

The U.S. Office of Vocational and Adult Education also supports the idea of linking basic skills to vocational education in the following statement published in the 1979 Federal Register: "Basic educational skills are essential to all persons, and vocational education must complement basic skills/remedial programs if persons are to succeed in vocational education programs."[2]

At a recent Utah State Office of Education conference on basic skills in vocational education, secondary and post-secondary administrators voiced the need for vocationally-specific instructional materials and assessments. The keynote speaker, Dr. James Dunn, from the Cornell Institute of Occupational Education, described the national need.

Some research and reference materials have been developed to deal with the problem. The Dictionary of Occupational Titles (DOT), Fourth Edition, provides ratings which indicate the complexity of "worker functions" in every occupation. These ratings were designed to provide information concerning the skills necessary in working with data (including numbers, words, symbols, and concepts), people and things.[3] This system addresses the need for both academic and occupational skills on the job. However, the aforementioned National Institute of Education study expresses the limitations of the DOT ratings. "These ratings permit only indirect inferences about the level of reading, writing, and arithmetic skills required in jobs."[4]

---

[1] Corman, Louise, Basic Skills Proficiencies of Secondary Vocational Education Students. (Washington D.C.: Vocational Education Study Publication No. 4, U.S. Department of Education, November, 1980)

[2] Federal Register (June 13, 1970), p. 33961

[3] Dictionary of Occupational Titles, Fourth Edition, 1979

[4] Corman, op. cit.

Another step toward linking academic skills to occupational tasks is the Vocational Preparation and Occupations Handbook (VPO)[5]. The primary purpose of the VPO is to integrate various occupational and U.S. government classification systems. However, the focus of the publication is not entry-level and the GED (General Educational Development) classification system it employs uses broad terms which are difficult to translate into basic skills instruction.

Occupational task analysis is another response to the need for defining tasks performed and the skills needed on the job. Task analyses are, however, oriented mostly toward occupational tasks, not academic skills. In a study funded through the Massachusetts State College, G. Porter Horne notes that, "Most job (task) analyses have not been specifically oriented toward identifying reading, writing, and math skills required for job performance," and "Business and industry also operate a number of basic skills training programs. However, research on these programs failed to discover any cooperation between task analysts and directors of reading, writing, and/or math programs."[6]

Teaching basic skills in a vocational context relates fundamental academic abilities to an occupation for which a student has an expressed interest. Since students are motivated to learn the job skills, relating the basic skills to them can add meaning and purpose to their basic skills instruction.

## RATIONALE

Basic skills such as reading, writing, listening, speaking and mathematics are an integral part of occupational duties and tasks. However, the basic skills portion of vocational training is not usually linked to the technical instruction because instructors lack accurate data about the basic skills required by a given occupation. Also, vocational counselors, curricula developers, and educational administrators need more specific information as they make decisions regarding the basic skill requirements of students.

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[5] National Occupational Information Coordinating Committee, Vocational Preparations & Occupations, Interim Edition, Vol. 1, Occupational and Educational Code Crosswalk (Ventura County Superintendent of Schools Office, 1979)

[6] G. Porter Horne, Functional Job Literacy: Implications for Instruction. (Boston, Mass., 1979, Massachusetts State College System)

Another problem is that few materials have been developed to teach vocationally specific basic skills. Therefore, it is important to search for those vocationally specific basic skills materials from commercial publishers and curriculum development/research centers. If there are not enough materials which teach basic skills for auto mechanics and auto body workers specifically, a search should be conducted for resources which teach them in a vocationally general manner, (i.e., readings, exercises and problems whose context is the world of work.)

Another area of need is that of evaluation. Basic skills pre- and post- assessments are important in determining what levels of proficiency should be required for entry into and exit from auto mechanics and auto body training programs. A search for basic skills assessments which are vocationally specific or vocationally general needs to be done.

# Project Objectives

1. Identify entry-level occupational tasks in auto mechanics and auto body.

2. Determine the basic skills (reading, writing, listening, speaking, and mathematics) necessary to accomplish the occupational tasks outlined in Objective One.

3. Identify and reference instructional resources (including texts, media, etc.) specific to each basic skill identified in Objective Two.

4. Identify and reference assessments specific to the basic skills identified in Objective Two.

# Project Methodology

## Methodology Associated With Objective One

OBJECTIVE ONE: Identify entry-level occupational tasks in auto mechanics and auto body.

---

### 1. ERIC Search

An ERIC (Educational Resources Information Center) search was conducted to find research linking basic skills to the occupations of auto mechanic and auto body worker. The following ERIC descriptors were used:

- Auto Mechanic/Body Worker
- Job skills
- Employment qualifications
- Entry workers
- Adult basic education
- Vocational education
- Vocational training
- Adult vocational training
- Technical education
- Trade and industrial education
- Content area reading
- Functional reading
- Remedial reading
- Literacy
- Functional literacy
- Occupational information
- Blue collar occupation
- Skilled workers
- Skilled occupation
- Basic skills
- Employable skills
- Communication skills
- Remedial mathematics
- Training (occupational)
- Workers
- Curriculum
- Competency-based education
- Task performance
- Job analysis
- Reading skills
- Minimum competencies
- Industrial training
- Pretechnology programs

Highlights of the ERIC search:

A review of the ERIC literature revealed some related studies. A rather large research project was developed in Prince Albert, Saskatchewan in 1975. The results, published in the *Generic Skills Handbook of Occupational Information*, appears to have been the first extensive attempt at linking basic skills to occupational tasks.

The California State Department of Education sponsored a 1977 project, *Adult Competency Education (ACE) Kit: Basic Skills in Speaking, Math, and Reading for Employment*, which includes research in more than 70 occupations.

A 1980 project, currently being field-tested in vocational and secondary educational institutions nationwide, was undertaken by the Cornell Institute for Occupational Education. This project is entitled Teaching Basic Skills Through Vocational Education.

The two studies found which would be of most use in this project, however, were: Occupational Analysis, developed by the Curriculum Materials Service, Colorado State University, Fort Collins, CO, and Task/Activity Analyses, developed by the Instructional Materials Laboratory at Ohio State University, Columbus, OH. They were used as a basis for gathering local data.

## 2. The DACUM Process

The decision was made to use an adaptation of the DACUM (Developing A Curriculum) method to determine the occupational tasks of an auto mechanic and auto body worker. DACUM is a group process developed in the 1960's by the Canadian Department of Regional Economic Expansion and the General Learning Corporation of New York. It requires a panel of expert workers and supervisors in an occupation to define the duties and tasks required by their occupation.

The panel of experts is selected according to the specialty areas within their occupation. The experts should have the following characteristics:

- Three to five years of full-time experience in the occupation
- Present full-time employment in it
- Good oral communication skills
- Ability to work cooperatively in a team

During two or three days' time, with the help of a group facilitator and recorder, a chart of the duties and tasks of the occupation is created by the panel. Panelists must agree on all duties and tasks defined.

## 3. Preparation for the DACUM Groups

### Group Facilitators

Three individuals with counseling and group process expertise were selected to facilitate the groups along with two individuals who had previously been trained in DACUM. Those without DACUM experience were oriented to the process.

### Basic Skills Taxonomies

Basic Skills taxonomies were selected from previous research studies done by other institutions. They were then adapted and edited for this process by the Salt Lake Skills Center basic skills instructors. The edited versions were printed onto large pieces of poster board and placed on the walls of the rooms where groups were to be held.

### 4. Adaptations of the DACUM Process

The automotive occupations under consideration consist of such diverse areas of specialization that it was necessary to have representatives from these areas meet in separate groups. The seven specialty area groups were: Brakes, Exhaust, Engine Rebuild, Tune-Up, Tires, Transmissions, Front End and the occupation of Auto Body. Thirty-five automotive representatives participated in the groups over a three-day period.

Another adaptation to the DACUM process was having the industry groups consider a combination of the Ohio State and Colorado State task lists, rather than develop their own with no input. This change in the process was made so that defining the occupational tasks could proceed more quickly and so that the panelists could consider the other experts' opinions. The group facilitators informed the panelists that they could delete, add, or modify any of the occupational tasks on the lists. The groups formulated a revised task list based on discussion and debate.

They were then ready to perform the basic skills analyses.

### Methodology Associated with Objective Two

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OBJECTIVE TWO: Determine the basic skills (reading, writing, listening, speaking and mathematics) necessary to accomplish the occupational tasks outlined in Objective One.

---

### Basic Skills Analysis

The group facilitator introduced the basic skills taxonomies which had been printed on poster paper. The five basic skills (reading, writing, listening, speaking and mathematics) were considered one by one. Each separate skill along with illustrative examples was thoroughly discussed. The facilitator assured him or herself that the group members understood each basic skill definition. (see Section III, Basic Communication and Mathematics Skills Used by Entry-Level AM's and ABW's, for basic skills taxonomies used in the study.)

The group then considered the occupational tasks they had defined one by one. The facilitator asked the group members to consider each basic skill carefully in relation to each occupational task. If the panelists agreed that a particular basic skill was needed, the recorder made note of this on the data sheet (see Appendix D for sample data sheet). Facilitators pressed group members to be specific (i.e., to give titles of reference books they use, to state what kinds of information they write on a work order, etc.)

An additional aspect of the groups was that throughout, UTC Skills Center counselors and instructors observed and listened. They were allowed to ask questions or comment to the representatives at various times.

All sessions were video or audio taped so that any ambiguities in the data could be clarified later.

## Methodology Associated with Objective Three

OBJECTIVE THREE: Identify and reference instructional resources (including texts, media, etc.) specific to each basic skill identified in Objective Two.

### Searching for Instructional Resources

In order to find materials that integrate basic communication and mathematics skills with auto mechanics and auto body or general vocational skills, a search was conducted through three sources: commercial publishers, the Educational Resources Information Center (ERIC) and vocational research and curricula development centers.

1. Commercial Publishers:

   The 1982 Publishers' Trade List is a complete roster of all commercial publishers within the United States. One section of the Trade List cites only those publishers that deal in educational books and media. There were six hundred and fifty publishers in this educational category. The information on the list indicated phone number and address, but not what types of educational materials the publisher produced. A form letter was sent to those publishers requesting a catalog if the firm offered instructional materials in auto mechanics and auto body or in the basic skills.

2. Educational Resources Information Center (ERIC):

An ERIC search was conducted with the help of the Information Retrieval Services Division of the Utah State Office of Education. The following descriptors were used:

Job literacy
Functional literacy
Literacy
Communication skills
Adult vocational training
Adult basic education
Auto mechanics
Literacy/auto mechanic
Reading
Writing
Mathematics
Verbal ability
Audiolingual skills
Listening skills/auto mechanic
Reading skills/auto mechanic
Math skills/auto mechanic
Speaking skills/auto mechanic
Writing skills/auto mechanic
Basic skills/auto mechanic
Listening
Speaking

Abstracts of research materials were printed out. The abstracts were used to order materials for review.

3. Vocational Research and Curriculum Development Centers:

Using the following publications, a list of one hundred names and addresses of research and curriculum development centers was generated.

Basic Skills in Vocational Education, Cornell Institute for Occupational Education, Cornell University, Ithaca, NY.

Everything You Wanted to Know About Resources for the Disadvantaged, Dept. of Applied Behavioral Science, University of California, Davis.

The Vocational Curriculum Catalogue, Vocational Curriculum Management Center, Buiilding 17, Airdustrial Park, Olympia, Washington 98505.

Vocational Curriculum Resources for Disadvantaged Students, A Guide to Print and Non-Print Instructional Materials, Vol. 1, Maryland Vocational Curriculum Research and Development Center, University of Maryland, College Park, MD 20742.

The same form letter that was sent to commercial publishers was sent to these centers soliciting pertinent instructional materials. (See Appendices A-1 and A-2 for the publishers and centers who responded affirmatively.)

## Obtaining Instructional Resources for Review

1. Commercial Publishers:

   A search through the catalogs of publishers who had responded to the form letter revealed thirty publishers who appeared to publish vocationally specific basic skills instructional materials or materials that teach the basic skills in a vocationally general context.

   Examination copies were requested from these publishers. The reviews of these materials follow in Section IV.

2. ERIC:

   Besides the ERIC search done at the beginning of the project, a search was done specific to each basic skill. Pertinent listings were ordered from ERIC Document Reproduction Service, P.O. Box 190, Arlington, VA 22210.

   All of the ERIC material except one resource was research, not intended for classroom use. The research material is included in the bibliography.

3. Resource Guides:

   A search through the catalogs of vocational research and curriculum centers revealed ten centers that appeared to have developed vocationally specific instructional materials or materials which teach the basic skills in a vocationally general context. Materials were requested on loan from those centers.

## Reviewing Instructional Materials

Review criteria were compiled from two sources: Everything You Wanted to Know About Resources for the Disadvantaged (Draft), Nemko and Dutton, Department of Applied Behavioral Sciences, University of California, Davis, 1982; and The Development of Instructional Materials: Study Guide, Module 8, American Institute for Research; U.S. Office of Education, 1976.

The criteria were:

- Inclusion of targeted basic skills
- Appropriateness for secondary and post-secondary students
- Vocational relevance (context)
- Reading level (determined by Fry Readability Scale * or by publishers' stated reading levels)
- Vocabulary carefully introduced and defined
- Frequent review
- Use of more than one learning modality
- Illustrations appealing, realistic, contemporary
- Inclusion of teacher's guide or instructions, and objectives
- Text well constructed and durable
- Cost
- Avoidance of racial, cultural and sexual stereotypes

* Fry, Edward B., Fry Readability Scale, Jamestown Publishers, P.O. Box 6743, Providence, RI 02940.

## Comments

Single page descriptions of all instructional materials reviewed according to the criteria follow in Section IV. In summary, the search revealed some instructional reading materials at low reading levels that are specific to auto mechanics or auto body. There are also some instructional reading materials in a general vocational context. More mathematics instructional materials specific to AM and AB are accessible, although the reading level is often quite high. The search uncovered no materials that instruct in listening, speaking or writing skills for AM or AB specifically. There are a few writing materials which do instruct in a general vocational context. A few listening and speaking materials vocationally general in approach were also found.

## Methodology Associated With Objective Four

OBJECTIVE FOUR: Identify and reference assessments specific to the basic skills identified in Objective Two.

---

## Searching For Basic Skills Assessments

1. ERIC Search:

An Eric search was done with the same descriptors as for the instructional materials (see p. 13) with the terms, "pre- and post-assessment", "evaluation", "measurement" and "test" added.

Highlights of the ERIC Search:

A review of the assessments cited in the ERIC results revealed very few vocationally specific assessments which included basic educational skills. Those which looked relevant to auto mechanics and auto body were ordered. Descriptions of them follow in the assessment review section.

2. Commercial Publishers:

Catalogs which the Assessment Center had previously collected were reviewed for assessment possibilities. Evaluations which the Assessment Center had already ordered and had examination copies for were collected.

The latest edition of The Eighth Mental Measurements Yearbook, Vols. I and II, Oscar Krisen Buros, was used as a source for other assessments. Any evaluation instruments appropriate for adults and secondary students which had not already been collected were ordered.

The publication, Tests of Functional Adult Literacy: An Evaluation of Currently Available Instruments, Northwest Regional Laboratory, was also used as a guide in searching for relevant assessments.

3. Vocational Research and Curriculum Development Centers:

The same publications which provided names and addresses of research/curriculum development centers for instructional resources were used. A form letter soliciting pertinent basic skills evaluations was also sent to those centers.

## Reviewing Assessment Resources

Subject matter experts responded to the following considerations in reviewing assessments:

Match of basic skill from taxonomy with assessment items
Item orientation (i.e., vocationally specific, general, life skills, etc.)

| | | |
|---|---|---|
| Level of item difficulty - | Low | 3-6th grade level |
| | Moderate | 6-9th grade level |
| | High | 9-12th grade level (or higher) |

The following criteria were also used in reviewing evaluations:

Date developed or published
Alternate forms
Scoring methods
Timed or untimed
Cost
Reporting format
Method of administration
Reliability and validity information where possible

It became apparent that so few assessments were vocationally specific, that broader categories would need to be considered. Therefore, 'vocationally general' and 'functional life skills' categories were added.

Single page reviews of the assessments follow in Section V.

## Section II

# Brief Summary of Results

(More detailed data are available in the individual basic communication and mathematics skills sections)

# OCCUPATIONAL TASK ANALYSES

## Occupational Task Analyses

The following duties and tasks were identified by a panel of expert workers in the specialty areas of Auto Mechanics and the occupation of Auto Body as being required of an entry-level worker in Utah. (The original AM and AB tasks lists derived from Colorado State and Ohio State are available in Appendix B.)

## AUTO MECHANICS

### Specialty: BRAKES

### DUTY - SERVICE AND REPAIR BRAKING SYSTEM

Tasks:

1. Visually inspect for fluid problems, master cylinder, adjacent systems and components
2. Hoist and inspect entire brake system on all four wheels
3. Inspect and adjust parking/emergency brake
4. Inspect power boost system, and test power unit and vacuum supply
5. Inspect pedal linkage
6. Make diagnosis report
7. Remove and replace brake shoes and disc pads, with knowledge of tools required
8. Clean and service backing plate
9. Rebuild and/or replace wheel cylinders, calipers and hardware
10. Machine or replace drums and rotors
11. Service all wheel bearing assemblies
12. Overhaul and/or replace master cylinders
13. Power and manually bleed all systems
14. Adjust all drum brakes
15. Perform final inspection and report
16. Operate a lathe and micrometer
17. Understand parts manual
18. Legally operate a vehicle
19. Have respect for customer's vehicle
20. Follow instructions and safety procedures

## Specialty: ENGINE REBUILD AND SERVICE

### DUTY - PERFORM ENGINE OVERHAUL ACTIVITIES

Tasks:

1. Adjust valves
2. Clean engine
3. Recognize an abnormal noise in running engine
4. Run compression test
5. Disassemble engine
6. Read shop manual
7. Grind and replace valves, reface valve seats, inspect heads for warp
8. Read and use micrometer
9. Inspect crankshaft
10. Replace crankshaft and bearings
11. Inspect exhaust systems, and inspect or replace exhaust pipe assemblies
12. Perform cylinder leakage tests
13. Perform operational inspections of engine lubrications systems
14. Perform operational inspections of positive crankcase ventilation (PCV) systems, and repair or service crankcase ventilation systems
15. Remove engines from vehicles
16. Replace camshaft, valve lifters, gasket seals, timing chains and belts, and timing gears and sprockets
17. Replace connecting rods and bearings, pistons, and rings on pistons
18. Replace engine mounts
19. Replace flywheels
20. Replace oil pump
21. Run a glaze breaker
22. Observe safety standards

### DUTY - MAINTAIN AND REPAIR COOLING SYSTEMS

Tasks:

1. Check coolant freezing points and coolant temperatures
2. Check overflow tanks and accessories
3. Chemically clean and flush cooling systems
4. Inspect, adjust and replace fan belts
5. Inspect water hoses
6. Pressure test cooling systems
7. Replace freeze plugs
8. Replace heater hoses
9. Replace radiator hoses
10. Replace radiator, and check automatic transmission fluid
11. Replace variable speed fans
12. Replace water pumps
13. Test and replace thermostats

## Specialty: EXHAUST SYSTEM

### DUTY - PERFORM OTHER ACTIVITIES

Tasks:

1. Actively participate in shop meetings
2. Prepare vehicle for work to be performed
3. Observe shop safety standards
4. Perform general shop clean-up duties

### DUTY - USE TOOLS, EQUIPMENT AND REFERENCES

Tasks:

1. Use booster cables to start vehicles
2. Use hoists and hydraulic presses
3. Use, maintain, organize all hand and power tools
4. Use all parts and service manuals
5. Use oxyacetylene welding equipment

### DUTY - IDENTIFY, REPAIR AND REPLACE EXHAUST SYSTEM

Tasks:

1. Check, remove, replace exhaust manifold and/or headers, if necessary
2. Check, remove, replace heat riser, donuts, and gaskets
3. Check, repair, replace "Y" and/or exhaust pipe
4. Check, remove, replace muffler and resonator
5. Check, remove, replace tail pipe
6. Check, remove, replace exhaust system hangers and clamps
7. Check exhaust system for clearance, leaks, loose or missing nuts and bolts

## Specialty: FRONT END

### DUTY - ALIGN AND REPLACE SUSPENSION SYSTEM

Tasks:

1. Check vehicle for loose parts
2. Replace steering spindle (standard, front end drive, four wheel drive)
3. Replace shock absorber (standard and McPherson Strut)
4. Replace front suspension control arm bushings (I-beam bushings)
5. Inspect and repair steering linkage
6. Replace ball joints
7. Replace torsion bar
8. Inspect and replace springs
9. Inspect and replace king pins
10. Inspect and align rear end
11. Inspect and align front end
12. Adjust worm and sector in steering box
13. Road test
14. Replace strut bushings
15. Inspect tires and tire pressure
16. Check wheel bearings
17. Center steering wheel
18. Observe safety standards
19. Balance tires

### DUTY - SERVICE AND REPAIR STEERING SYSTEMS (PASSENGER CARS AND LIGHT TRUCKS)

Tasks:

1. Understand basic principles of power steering
2. Repair power and manual steering gear box (rack and pinion)
3. Repair power steering pump
4. Test power steering pump pressure
5. Inspect steering for looseness or leakage
6. Inspect and repair steering linkage
7. Replace sector shaft seal
8. Adjust worm and sector in steering box
9. Use and apply various types of fluids and/or lubricants
10. Observe and follow safety standards
11. Final inspection and road test vehicle

## Specialty: TIRES

### DUTY - PERFORM TIRE MAINTENANCE

Tasks:

1. Use proper safety precautions
2. Use pneumatic tools (jack, impact wrench, grinder, stud gun)
3. Raise and lower vehicle with the lift
4. Perform underside inspection of shocks and brakes
5. Inspect tires on vehicle
6. Remove tire and visually inspect interior, bead, rim, and valve stem
7. Repair, replace or adjust tire
8. Mount tire
9. Balance tire

## Specialty: TRANSMISSIONS

### DUTY - APPLY SAFE, COURTEOUS AND CLEAN WORK HABITS

Tasks:

1. Apply cleanliness procedures
2. Respect clients' personal property
3. Understand and use shop safety principles (including proper clothing)
4. Use proper shop etiquette (language, temper, etc.)

### DUTY - MINOR REPAIRS AND SERVICES

Tasks:

1. Replace faulty external seals and bushings
2. Service and adjust transmission
3. Replace U-joints and mounts
4. Repair cooler line leaks
5. Install auxiliary coolers
6. Replace fan clutch
7. Use proper lubricant for vehicle
8. Check for proper fluid level

### DUTY - REMOVE AND INSTALL AUTOMATIC TRANSMISSIONS

Tasks:

1. Road test vehicle before and after (basic knowledge)
2. Raise vehicle and install jack stands
3. Drain transmission fluid, remove pan, and inspect
4. Support engine
5. Remove drive shaft and inspect U-joints
6. Disconnect converter from flywheel
7. Remove transmission mounts and frame cross member
8. Disconnect linkages, cables, tubes, lines, wires, and exhaust
9. Remove transmission bolts from engine
10. Remove transmission and converter
11. Inspect flywheel
12. Inspect linkages, cables, tubes, lines, wires, and exhaust
13. Reverse procedure for installation of components
14. Fill transmission with proper lubricant
15. Check for fluid retention
16 Flush or blow out cooler lines
17. Drill, tap, and flush torque converter
18. Pack test transmission
19. Lower vehicle
20. Properly secure vehicle for removal from lift with transmission removed
21. Adjust cables and linkages after repair

## Specialty: TRANSMISSIONS (Cont'd)

### DUTY - REMOVE AND INSTALL STANDARD TRANSMISSIONS

Tasks:

1. Road test vehicle before and after (basic knowledge)
2. Raise vehicle and install jack stands
3. Drain and inspect lubricant
4. Support engine
5. Remove drive shaft and inspect U-joint
6. Remove transmission mounts and frame cross member
7. Disconnect linkages, cables, wires, and exhaust
8. Remove transmission bolts from bell housing or engine
9. Remove transmission
10. Inspect linkages, cables, wires, and exhaust
11. Reverse procedure for installation of components
12. Fill transmission with proper lubricant
13. Check for fluid retention
14. Adjust clutch and linkages
15. Check and bleed hydraulic system
16. Lower vehicle
17. Properly secure vehicle for removal from lift with transmission removed (when necessary)
18. Inspect clutch components

### DUTY - REMOVE AND INSTALL CLUTCH

Tasks:

1. Remove transmission and/or bell housing
2. Remove clutch disc, pressure plate, and release bearing
3. Inspect pilot bushing or bearing and replace if needed
4. Inspect flywheel
5. Inspect hydraulic system when applicable
6. Reverse procedure on tasks 1 and 2
7. Adjust clutch
8. Road test before and after

## Specialty: TUNE-UP

### DUTY: PERFORM EVALUATION AND INSPECTION ACTIVITIES

Tasks:

1. Conduct spot checks on malfunctions and report any defects
2. Inspect and test windshield wiper motor, blades, and arms
3. Inspect tires and wheels
4. Inspect vehicles for mirrors
5. Inspect vehicles received or sold by an organization, perform inspections on vehicle conditions and prepare inspection reports

### DUTY: SERVICE AND REPAIR IGNITION SYSTEMS

Tasks:

1. Verify complaint
2. Check and set dwell
3. Check and adjust timing
4. Service or replace spark plugs
5. Check and replace points and condensor
6. Check and replace ignition primary resistor
7. Check and replace ignition coil
8. Test plug wires
9. Test cold start circuit
10. Strobe distributor
11. Service and replace transistor amplifier (control module)
12. Service and repair ballast resistor
13. Service and replace coil
14. Adjust reluctor air gap
15. Check vacuum advance (centrifugal advance distributor wear)

### DUTY: SERVICE AND REPAIR EMISSION SYSTEMS

Tasks:

1. Service engine breathing systems
2. Service air inductions system
3. Service evaporative emission system
4. Service exhaust gas control system - catalytic converter
5. Service heated air system

## Specialty: TUNE-UP (Cont'd)

### DUTY: SERVICE AND REPAIR CHARGING SYSTEMS

Tasks:

1. Test battery
2. Test starter system
3. Service or replace battery
4. Repair charging circuit

### DUTY: SERVICE AND REPAIR ACCESSORY SYSTEMS

Tasks:

1. Test windshield wipers
2. Repair windshield wipers
3. Test blower motor
4. Service blower motor
5. Adjust headlights

### DUTY: SERVICE AND REPAIR CRANKING SYSTEMS

Tasks:

1. Check starter draw
2. Test starter motor
3. Troubleshoot and repair starter circuit

## AUTO BODY

### DUTY - REFINISH

Tasks:

1. Wash and dewax area(s) to be repaired
2. Inspect for surface defects
3. Featheredge broken surfaces
4. Treat bare metal chemically
5. Remove decorative trim and mask
6. Mix and apply primer/surfacer and putty
7. Prepare for color coats by guide coating and block sanding
8. Mix and apply top coats
9. Polish and wax
10. Clean spray guns and paint equipment
11. Apply two-stage paint
12. Paint non-metal parts

### DUTY - REPAIR AND PATCH DAMAGES

Tasks:

1. Determine direction of force or impact
2. Determine extent of damage
3. Repair damaged panels
4. Shrink metal
5. Understand estimates
6. Align and adjust body panels and hinges
7. Install sheet metal patches (rust)

### DUTY - REMOVE AND REPLACE PANELS

Tasks:

1. Remove and replace bolted or screwed on parts and panels
2. Remove and replace attached panels
3. Remove and replace glass

### DUTY - TRIM, HARDWARE

Tasks:

1. Remove and install exterior trim and trim panels
2. Carefully remove and replace interior trim
3. Partially remove and re-glue vinyl top

## DUTY - SAFETY

Tasks:

1. Understand and use shop safety principles

## DUTY - WELDING

Tasks:

1. Set up, test and use acetylene equipment
2. MIG weld (Metal Inert Gas)
3. Spot weld
4. Repair fiberglass and plastic

## DUTY - REPAIR FRAME DAMAGE

Tasks:

1. Repair frame damage and unibody(s)
2. Remove and reinstall steering and suspension system

# BRIEF SUMMARY OF BASIC SKILLS DATA

## Brief Summary of Basic Skills Data

Group participants identified the reading, writing, listening, speaking and mathematics skills AM's and ABW's need to perform occupational tasks. Then a comparative percentage analysis of all the required basic skills was done.

AUTOMOTIVE AREAS ANALYZED ACCORDING TO PERCENTAGES OF BASIC COMMUNICATION AND MATHEMATICS SKILLS REQUIRED *

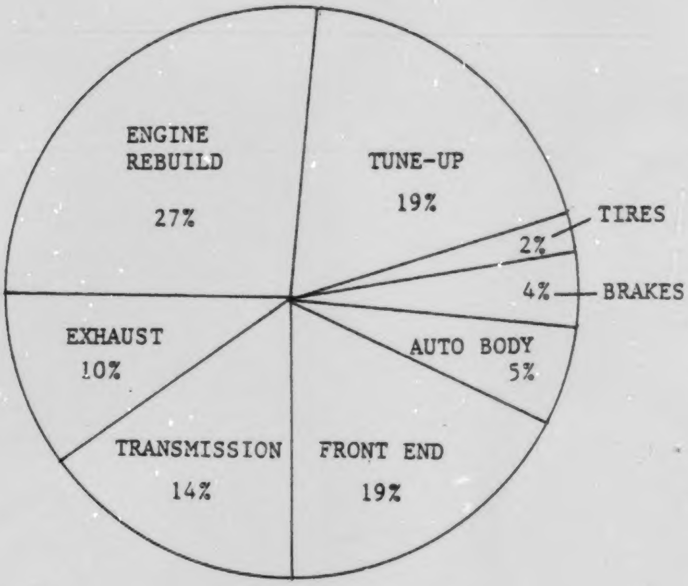

**Figure 1**

Respondents indicated that the Engine Rebuild specialty area requires the most use of communication and math skills (27%), followed by Tune-Up (19%), and Front End (19%).

The area of Transmission requires 14% usage of the basic skills, and Exhaust requires 10%.

Auto Body requires (5%), Brakes (4%), and Tires (2%) of the communication and maths skills used by automotive workers.

*Percentages were rounded off

PERCENTAGE ANALYSIS OF THE COMMUNICATION AND MATHEMATICS SKILLS REQUIRED OF AN ENTRY-LEVEL AM AND ABW *

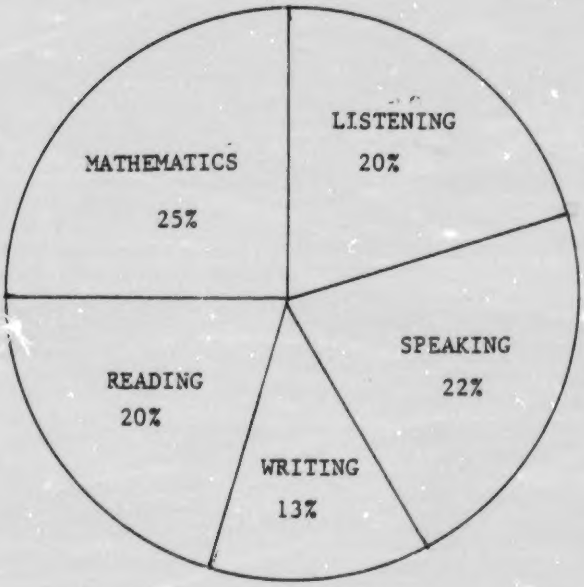

**Figure 2**

Of the communication and mathematics skills included in the survey, the industry group reported that mathematics skills are most used on the job by entry-level AM's and ABW's (25% of all occupational tasks require math).

Speaking skills are almost as necessary (22%), as are reading and listening (20% each).

Although necessary, writing skills are not as essential on the job as the other communication skills. Only 13% of AM and ABW tasks require writing.

* Percentages were rounded off

## Job-Related Reading Skills

Relative importance of specific reading skills:

The most important reading skill in terms of frequency of performance is literal reading (60% of all reading skills), or reading to find specific information, follow directions, or understand and remember stated facts.

The least important reading skill in terms of frequency of performance is critical reading (13% of all reading skills), or reading in order to solve problems, judge importance of material, or understand concepts.

The specialty areas requiring the greatest number of reading skills are Engine Rebuild, Tune-Up and Front End.

## Job-Related Writing Skills

Relative importance of specific writing skills:

The most important writing skill in terms of frequency of performance is mechanics (71% of all writing skills), or using correct alphabetical order, spelling, punctuation, and neatness.

The least important writing skill in terms of frequency of performance is composing (4%), or creating original paragraphs, letters, formal or technical material.

The specialty areas requiring the greatest number of writing skills are Engine Rebuild, Tune-Up and Transmission .

## Job-Related Listening Skills

Relative importance of specific listening skills:

The most important listening skill in terms of frequency of performance is literal listening (59% of all listening skills), or listening to facts in order to follow istructions, get information, respond to emergencies, or remember details.

The least important listening skill in terms of frequency of performance is critical listening (12% of all listening skills), or listening to evaluate or judge the importance of information received or to understand technical concepts.

The specialty areas requiring the greatest number of listening skills are Engine Rebuild and Tune-Up.

## Job-Related Speaking Skills

Relative importance of specific speaking skills:

> The most important speaking skill in terms of frequency is pronouncing words clearly and correctly and using vocabulary that fits the situation (47%).
>
> The least important speaking skill in terms of frequency is explaining or describing objects, events, experiences, and giving details that illustrate a purpose or concept (19%).
>
> The specialty areas requiring the greatest number of speaking skills are Tune-Up and Engine Rebuild.

---

## Job-Related Math Skills

Relative importance of specific math skills:

> The most important math skill in terms of frequency is using whole numbers (31%), or adding, subtracting, multiplying and dividing.
>
> The least important math skill in terms of frequency is using percents (5%).
>
> The specialty areas requiring the greatest number of math skills are Front End, Engine Rebuild and Exhaust.

## Section III

# Basic Communication and Mathematics Skills Used by Entry-Level Auto Mechanics and Auto Body Workers

# Reading

## Reading Taxonomy

The reading taxonomy used in this study consists of these three categories:*

1. LITERAL

   Reading to find specific information, follow directions, understand and remember directly-stated facts

2. INTERPRETIVE

   Reading "between the lines" in order to draw conclusions or relate new material to previous knowledge

3. CRITICAL

   Reading to solve problems, evaluate, or understand concepts

According to the respondents, all three categories of reading are used by an entry-level AM and ABW, as percentages in Fig. 3 indicate.

* Sources:

*Job Literacy: A Study of Literacy Demands, Attitudes, and Strategies in a Cross-Section of Occupations*, Bloomington, IN 1980.

*Job-Related Reading Tasks: Teaching Marginally Literate Adults to Read*, Sticht, T.G. 1978.

*Correlates of Reading: The Consensus of Thirty Years of Correctional Research*, Austin, TX 1981.

# READING SKILLS

ANALYZED ACCORDING TO PERCENTAGES
OF EACH TYPE OF READING REQUIRED *

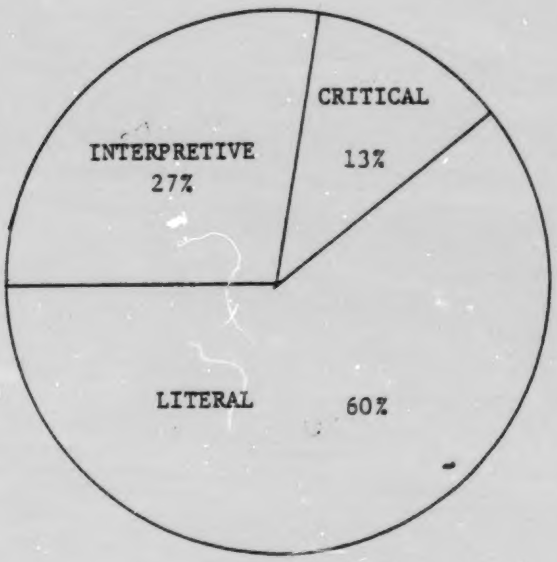

**Figure 3**

Industry participants in this study reported that 60% of all reading done by entry-level AM's and ABW's is literal reading (reading to find specific information).

Twenty-seven percent was reported to be interpretive (reading "between the lines" in order to draw conclusions or relate new material to previous knowledge).

Only 13% of the reading was critical (reading to solve problems, evaluate, or understand concepts).

* Percentages were rounded off

READING SKILLS

ANALYZED ACCORDING TO
OCCUPATION AND SPECIALTY AREA *

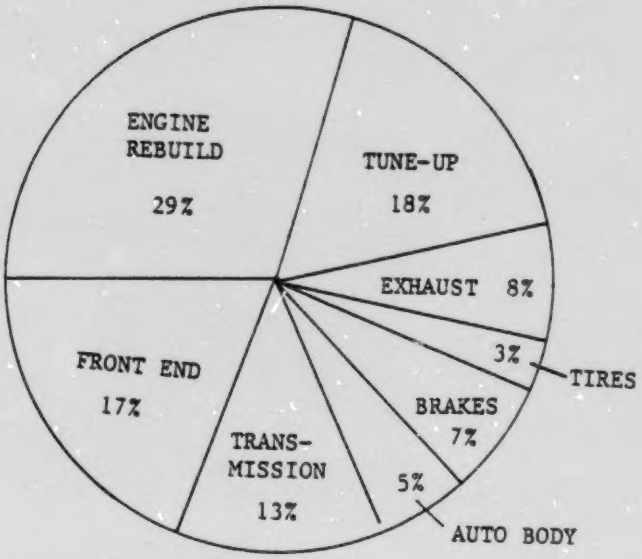

**Figure 4**

Respondents indicated that reading is required most in the Engine Rebuild area (29%).

Eighteen percent of the total reading is linked to Tune-Up, 17% to Front End, 13% to Transmission, and 8% to Exhaust.

Brakes (7%), Auto Body (5%), and Tires (3%) require the least reading.

* Percentages were rounded off

## Reading Skills Linked To Auto Mechanics Specialty Areas

(This list was also formulated by the industry participants, but does not necessarily comprise a complete one.)

An entry-level AM applies reading skills to the following:

| | |
|---|---|
| BRAKES: | Shop manuals |
| | Warning signs |
| ENGINE REBUILD: | Tickets |
| | Specifications |
| | Micrometer |
| | Manuals (see Appendix C) |
| | Oil pressure specifications |
| | Label directions on anti-freeze (see Appendix C) |
| | Label directions on bottles of chemicals |
| | Belt gauge |
| | Cylinder bore gauge |
| | Hydrometer |
| | Engine analyzer |
| EXHAUST: | Catalogs to cross-reference prices |
| FRONT END: | State inspection handbook (see Appendix C) |
| | Safety codes |
| | Work order instructions |
| | Gauges |
| | Manuals |
| | Instructions to hook up power steering pump |
| | Tire gauges |
| | Estimates |
| TIRES: | Work orders (see Appendix C) |
| | Tire gauge |
| | Balance machine gauge |
| | Wheel size numbers |
| TRANSMISSION: | Parts catalogs |
| | Gauges |
| | Repair orders |
| | Diagnostic reports |
| TUNE-UP: | Technical up-dates |
| | Manuals |
| | Specifications on choke |
| | Wiring schematics (see in Appendix C) |
| | Flow charts |

# Reading Skills Linked To Auto Body

(This list was also formulated by the industry participants, but does not necessarily comprise a complete one.)

An entry-level ABW applies reading skills to the following:

Label directions on can of silicone, polish remover and dewaxer
Instructions on paint can
Cleaning intructions on new equipment
Instructions on decal
Abbreviations on estimate (see in Appendix C)
Label directions on box of trim
Manuals
Catalogs

# Writing

# Writing Taxonomy

The writing taxonomy used in this study consists of three catagories: *

1. MECHANICS:

   Using correct alphabetical order, neatness, spelling, punctuation.

2. USING CORRECT ENGLISH:

   In phrases and sentences

3. COMPOSING:

   Paragraphs, letters, formal and technical material

According to the respondents, all three levels of writing are used by an entry-level worker in these occupations, as percentages in Fig. 5 indicate.

---

* Sources:

Job Literacy: A Study of Literacy Demands, Attitudes and Strategies in a Cross-Section of Occupations, Bloomington, IN 1980.

Teaching Writing Skills in Vocational Education, Cornell University, 1980.

## WRITING SKILLS

### ANALYZED ACCORDING TO PERCENTAGES OF EACH TYPE OF WRITING REQUIRED *

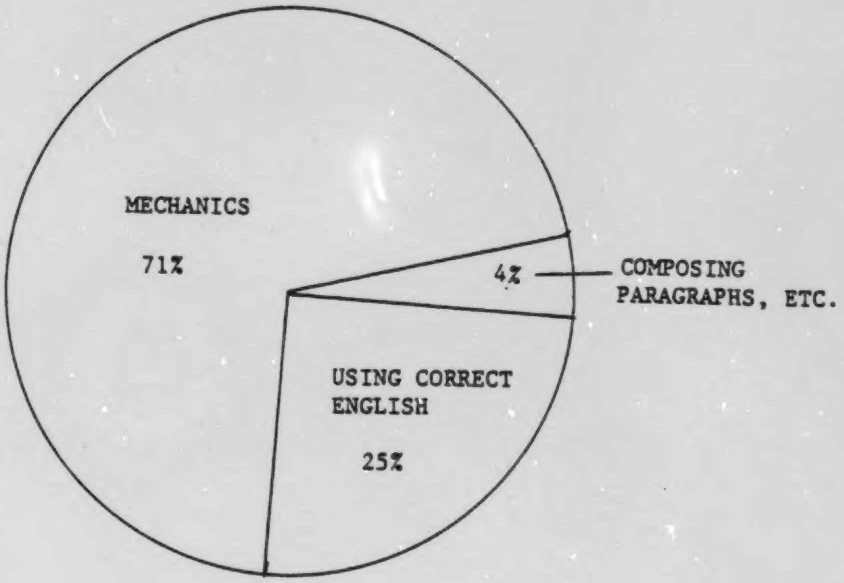

**Figure 5**

Seventy-one percent of the writing done by AM's and ABW's involves writing mechanics (using correct alphabetical order, neatness, correct spelling and punctuation).

Twenty-five percent of the writing done by AM's and ABW's involves writing clear and correct phrases and sentences.

Only 4% of the writing consists of composing paragraphs, letters or technical material.

* Percentages were rounded off

## WRITING SKILLS

## ANALYZED ACCORDING TO OCCUPATION AND SPECIALTY AREA *

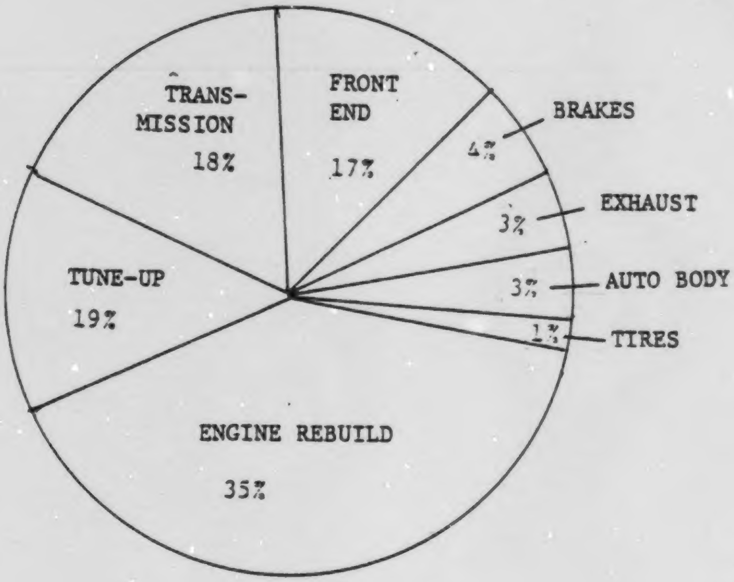

**Figure 6**

Respondents indicated that writing is required of entry-level workers most often in Engine Rebuild (35%).

Nineteen percent of the total writing is linked to Tune-Up, 18% to Transmission, and 17% to Front End.

Brakes (4%), Exhaust (3%), Tires (1%) and the occupation of Auto Body (3%) require the least writing.

* Percentages were rounded off

## Writing Skills Linked To Auto Mechanic Specialty Areas

(This list was formulated by the industry participants, but does not necessarily comprise a complete one.)

An entry-level AM applies writing skills to the following:

| | |
|---|---|
| BRAKES: | Abbreviations on work order<br>Reports on completed work |
| ENGINE REBUILD: | Work done (on shop order)<br>Findings of compression test<br>Warpage<br>Abbreviations<br>Problems with engine |
| EXHAUST: | Parts numbers |
| FRONT END: | Inspection sheets<br>Parts numbers<br>Tire tread measures<br>Notes for personal memory aids<br>Confirmation that safety standards have been observed |
| TRANSMISSION: | Accident forms<br>Road test forms |
| TUNE-UP: | Specifications on worksheet<br>Parts requisitions<br>Record of vacuum advance timing |

## Writing Skills Linked To Auto Body

(This list was formulated by the industry participants, but does not necessarily comprise a complete one.)

An entry-level ABW applies writing skills to the following:

Location of damage
Extra damage (written on back of estimate)

# Listening

# Listening Taxonomy

The listening taxonomy used in this study consists of these three categories: *

1. LITERAL

   Listening to facts in order to follow directions, get information, remember details, or respond to emergencies

2. INTERPRETIVE

   Listening "between the words" in order to understand the main idea or purpose of a message, draw conclusions, or determine usefulness

3. CRITICAL

   Listening to evaluate or judge importance; understand technical concepts

According to the respondents in this study, all three levels of listening are used by an entry-level worker in these occupations, as percentages in Fig. 7 indicate.

* Sources:

Linking Basic Skills to Occupational Tasks and Vocational Training: Clerk-Typist, Salt Lake Skills Center.
Occupational Communications Skills Analysis, Washington State Commission for Vocational Education.
Teaching Basic Skills Through Vocational Education, Cornell University.
The Massachusetts Basic Skills Assessment of Listening and Speaking, Massachusetts Dept. of Education.
Listening Skills Schoolwide: Activities and Programs, National Institute of Education.
A Practical Problem of Listening Training, St. Edward's University, Austin, TX.
Listening: The Forgotten Skill, John Wiley & Sons.

## LISTENING SKILLS

## ANALYZED ACCORDING TO PERCENTAGES OF EACH TYPE OF LISTENING REQUIRED*

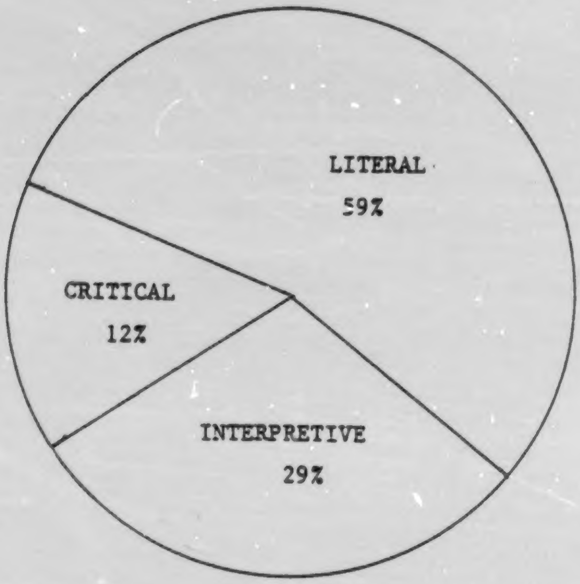

**Figure 7**

The respondents indicated that 59% of all listening required of AM's and ABW's is literal (listening to facts in order to follow directions, get information, respond to emergencies, or remember details).

Twenty-nine percent of the listening was reported to be interpretive (understanding the main idea or purpose of a message, drawing conclusions, or determining usefulness).

Respondents also indicated that only 12% of the listening is critical (listening to evaluate or judge the importance of information received or to understand technical concepts).

* Percentages were rounded off

## LISTENING SKILLS

## ANALYZED ACCORDING TO OCCUPATION AND SPECIALTY AREA *

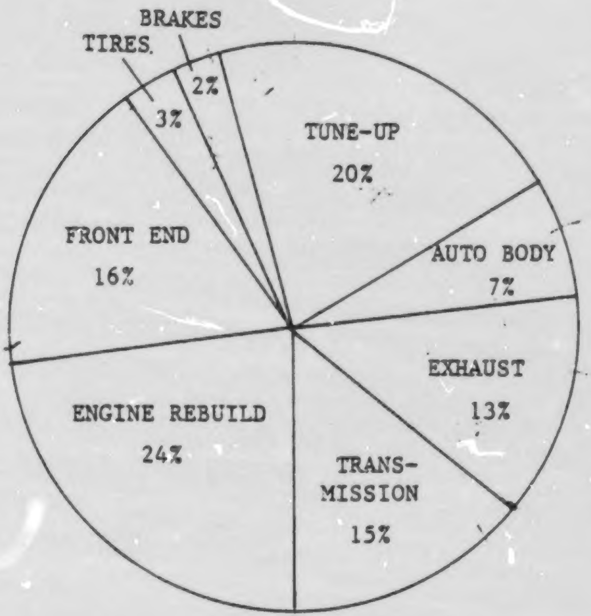

**Figure 8**

Respondents indicated that listening is required most in the areas of Engine Rebuild (24%), and Tune-Up (20%).

Sixteen percent of the total listening is linked to Front End, 15% to Transmission, and 13% to Exhaust.

Listening is comparatively less essential in Auto Body (7%), Tires (3%), and Brakes (2%).

---

* Percentages were rounded off

## Listening Skills Linked To Auto Mechanics Specialty Areas

(This list was formulated by the industry participants, but does not necessarily comprise a complete one.)

An entry-level AM applies listening skills to the following:

| | |
|---|---|
| BRAKES: | Instructions from supervisor and other workers |
| ENGINE REBUILD: | Instructions<br>Noise during compression test<br>Leaks to determine source<br>Whistle on belt |
| EXHAUST: | Flame on welding equipment |
| FRONT END: | Instructions to replace mechanisms<br>Customer descriptions of vehicle problem(s) |
| TIRES: | Instructions<br>Air when raising or lowering vehicle |
| TUNE-UP: | Abnormal noises |

## Listening Skills Linked To Auto Body

(This list was formulated by the industry participants, but does not necessarily comprise a complete one.)

An entry-level ABW applies listening skills to the following:

Instructions to go ahead and do prep work; cut panel in half

Information about possible hazards (e.g., "Be sure and put the chain back on the acetylene tank"; "Wear goggles", etc.)

# Speaking

# Speaking Taxonomy

The speaking taxonomy used in this study consists of these three categories: *

1. PRONOUNCING AND USING LANGUAGE PROPERLY

   Pronouncing words clearly and correctly, and using vocabulary that fits the situation

2. REQUESTING & GIVING LITERAL MESSAGES

   Stating facts and details directly, asking for or giving directions, relaying emergency messages

3. EXPLAINING OR DESCRIBING

   Describing objects, events, experiences, and giving details that illustrate a purpose or concept

According to respondents in the study, all three levels of speaking are used by entry-level workers in these occupations, as percentages in Fig. 9 indicate.

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* Sources:

*Linking Basic Skills to Occupational Tasks and Vocational Training: Clerk-Typist*, Salt Lake Skills Center.
*Occupational Communications Skills Analysis*, Washington State Commission for Vocational Education.
*Teaching Basic Skills Through Vocational Education*, Cornell University.
*The Massachusetts Basic Skills Assessment of Listening and Speaking*, Massachusetts Dept. of Education.
*Listening Skills Schoolwide: Activities and Programs*, National Institute of Education.
*A Practical Program of Listening Training*, St. Edward's University, Austin, TX.
*Listening: The Forgotten Skill*, John Wiley & Sons.

## SPEAKING SKILLS

ANALYZED ACCORDING TO PERCENTAGES
OF EACH TYPE OF SPEAKING REQUIRED *

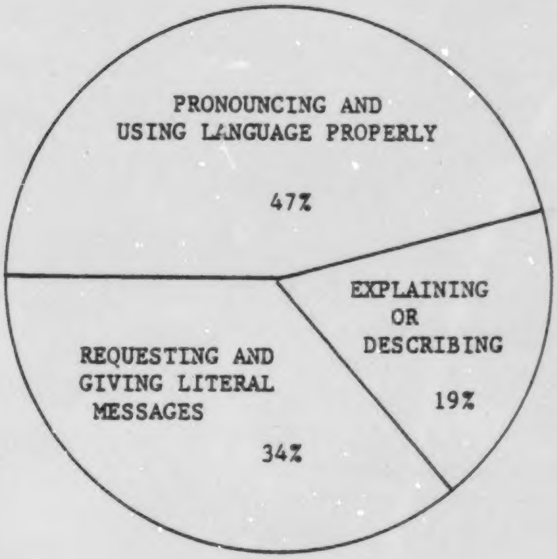

**Figure 9**

Respondents indicated that 47% of the speaking done by AM's and ABW's consists of using correct pronunciation and appropriate vocabulary (using language properly).

Requesting and giving factual messages comprises 34% of the speaking done by entry-level AM's and ABW's.

Nineteen percent of the speaking is to explain or describe.

* Percentages were rounded off

## SPEAKING SKILLS

## ANALYZED ACCORDING TO OCCUPATION AND SPECIALTY AREA *

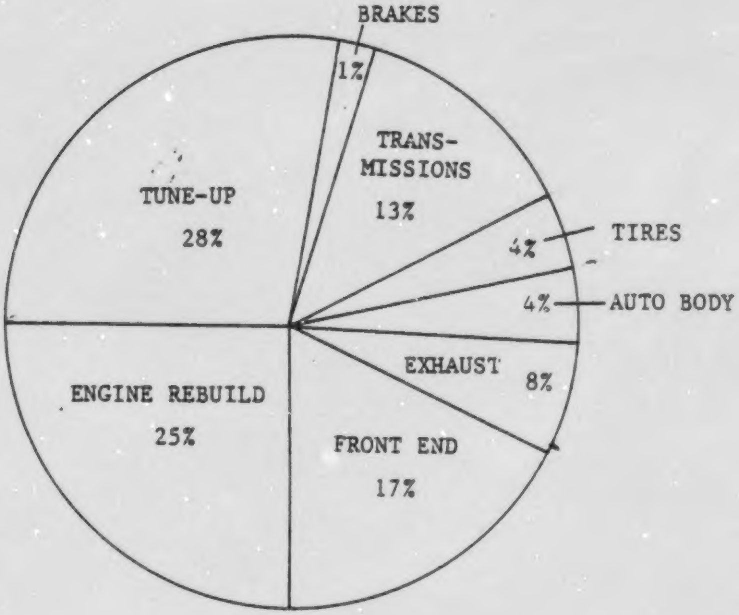

**Figure 10**

According to respondents, speaking is required of entry-level workers most often in Tune-Up (28%) and Engine Rebuild (25%).

Seventeen percent of the total speaking is linked to Front End, 13% to Transmission, and 8% to Exhaust.

Speaking is comparatively less essential in Auto Body (4%), Tires (4%), and Brakes (1%).

* Percentages were rounded off

## Speaking Skills Linked To Auto Mechanics Specialty Areas

(This list was formulated by the industry participants, but does not necessarily comprise a complete one.)

An entry level AM uses speaking skills to:

| | |
|---|---|
| BRAKES: | Report on work done |
| ENGINE REBUILD: | Explain noise heard during compression test<br>Report inspection findings<br>Interpret problem with exhaust system<br>Explain what part is being replaced and why<br>Explain scaling, hardness, lamination |
| EXHAUST: | Ask for assistance |
| FRONT END: | Explain to service manager what is wrong<br>Request parts<br>Describe observations from road test<br>Describe repair |
| TIRES: | Request parts<br>Request tools<br>Explain problems found during underside inspection (to customer) |
| TRANSMISSIONS: | Inform manager what work has been done |
| TUNE-UP: | Report results of inspection to manager |

## Speaking Skills Linked To Auto Body

(This list was formulated by the industry participants, but does not necessarily comprise a complete one.)

An entry-level ABW uses speaking skills to:

Report that work has been completed
Report any problems
Point out where defects are
Point out damage discovered that was not on estimate
Confirm understanding

# Mathematics

# Mathematics Taxonomy

The mathematics taxonomy used in this study consists of these categories: *

| | | | |
|---|---|---|---|
| 1. | WHOLE NUMBERS | - | Counting, adding, subtracting, multiplying, dividing |
| 2. | MEASUREMENTS | - | Linear, volume, capacity, mass |
| 3. | FRACTIONS | - | Recognition, ordering, adding, subtracting, multiplying, dividing |
| 4. | DECIMALS | - | Money, adding, subtracting, multiplying, dividing, converting fractions to decimals and vice versa |
| 5. | PRACTICAL PROBLEMS | - | Using math functions to solve applied problems |
| 6. | PERCENTAGES | - | Computing mark-ups, bonuses, etc. |

According to the participants in this study, all of the categories of math skills above are used by entry-level workers in these occupations, as percentages in Fig. 11 indicate.

* Sources:

Basic Mathematics Skills and Vocational Education, Thomas Long.
The Mathematics Teacher, Long & Herr, 1973.
Teaching Mathematics Skills in Vocational Education, Cornell University, 1980.

MATHEMATICS SKILLS

ANALYZED ACCCORDING TO PERCENTAGES
OF EACH TYPE OF MATHEMATICS REQUIRED *

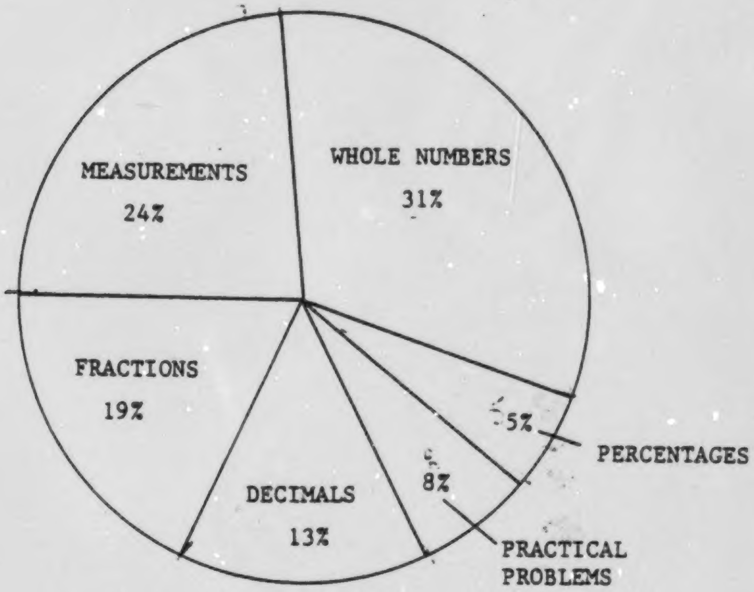

**Figure 11**

Nearly one-third (31%) of the required math skills for entry-level AM's and ABW's involves whole numbers (counting, adding, subtracting, multiplying, dividing).

Nearly one-fourth (24%) of all math tasks required of entry-level AM's and ABW's consists of measurements (linear, capacity, volume, mass).

The remainder is divided as follows: 19% fractions (recognition, ordering, adding, subtracting, multiplying, dividing); 13% decimals (money, adding, subtracting, multiplying, dividing, converting fractions to decimals and decimals to fractions); 8% practical problems (using math functions to solve applied problems); and percentages (used to compute mark-ups, bonuses, etc.) represent 5% of the total.

* Percentages were rounded off

MATHEMATICS SKILLS

ANALYZED ACCORDING TO
OCCUPATION AND SPECIALTY AREA *

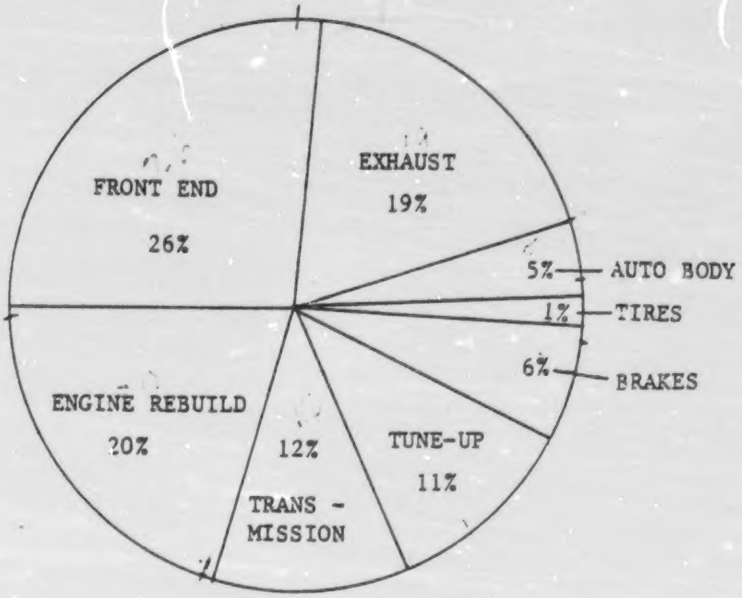

**Figure 12**

Industry participants stated that math is required most in Front End (26%). It is also an important skill in Engine Rebuild (20%), and Exhaust (19%).

Twelve percent of the total math skills is linked to Transmission, and 11% to Tune-Up.

Math is comparatively less essential in Brakes (6%), Tires (1%), and Auto Body (5%).

* Percentages were rounded off

## Mathematics Skills Linked To Auto Mechanic Specialty Areas

(This list was formulated by the industry participants, but does not necessarily comprise a complete one.)

An entry-level AM uses math skills to:

| | |
|---|---|
| BRAKES: | Use micrometers |
| ENGINE REBUILD: | Measure valve stem thickness |
| | Cut angles on valves |
| | Measure bearings |
| | Measure percentage of leakage |
| | Measure connecting rods |
| | Measure camshaft |
| | Measure pump size |
| | Measure quarts of anti-freeze |
| | Measure chemicals (for cooling system) |
| | Determine diameter of water hose |
| | Measure heat in degrees |
| EXHAUST: | Determine numbers of parts and tools |
| | Measure clearance on exhaust system |
| FRONT END: | Determine pounds of torque |
| | Measure where nut belongs |
| | Turn tire rods |
| | Use aligning machine |
| | Measure wheel weights |
| | Refill system |
| | Measure volume |
| TIRES: | Use pneumatic tools (fractions) |
| | Measure tire size |
| | Count lug nuts |
| | Determine degrees of angles |
| TRANSMISSIONS: | Measure U-joints |
| | Read part numbers in catalogs |
| | Give size of cooler |
| | Measure oil |
| | Read gauges |
| | Measure free play on clutch |
| TUNE-UP: | Use a brake calibrator |
| | Measure length of wiper arms |
| | Measure tread depth on tire with gauge |
| | Check and set dwell (in degrees) |
| | Measure voltage |
| | Check ohms |
| | Read amps |

## Math Skills Linked To Auto Body

(This list was formulated by the industry participants, but does not necessarily comprise a complete one.)

An entry-level ABW uses math skills to:

- Determine dilution percentage
- Determine percentage of thinner to add to primer (25%, 50%, etc.)
- Read wrenches (metrics)
- Cut trim to measurements
- Measure pressure (acetylene and oxygen)

## Section IV
# Review of Instructional Resources

# Review of Instructional Resources

## INTRODUCTION

Communication skills are interwoven and interdependent. It is sometimes difficult to classify instructional materials into only one category, (e.g., it is hard to say if a text is a reading or writing text when both skills are required of the student). In order to classify each text in this section according to a basic skill, it was necessary to consider the primary teaching objective of each text and not the skills required by the student to reach that teaching objective.

Mathematics texts are easier to classify of course. Reading grade level is not included in the reviews of all of the math resources because not all math texts include word problems from which a level can be determined.

## Vocationally Specific or Vocationally General Basic Skills Instructional Resources

## TABLE OF CONTENTS

Reading - Vocationally Specific (pp. 89 to 96)

- AUTO BODY (and AUTO SERVICE) (also listening practice)
- AUTO MECHANIC'S VOCABULARY SKILLS: THE AUTOMATIC TRANSMISSION (also listening practice)
- AUTOMOBILE MAINTENANCE (READING AND LANGUAGE ACTIVITIES)
- BASIC READING INSTRUCTION FOR STUDENTS IN AUTOMOTIVE MECHANICS
- CAREER EDUCATION (also speaking practice)
- READINGS IN THE AUTOMOTIVE TRADE (also speaking and writing practice)
- SHOPTALK
- TUNE UP 1, 2, 3

Reading - Vocationally General (pp. 99 to 102)

- COORDINATED VOCATIONAL EDUCATION AND TRAINING (also writing practice)
- DO YOU READ ME?
- VOCATIONAL ENGLISH (also writing practice)
- YOU AND YOUR WORK

Writing - Vocationally General (pp. 105 to 108)

- ADULT WRITING AND READING EXPERIENCES (also speaking, listening and reading practice)
- APPLIED PENMANSHIP
- WRITING FOR THE WORLD OF WORK
- IMPROVE YOUR WRITING FOR JOB SUCCESS

Listening and Speaking - Vocationally General (pp. 111 to 112)

- COMMUNICATING AT WORK (also writing practice)
- THE BUSINESS OF ORAL COMMUNICATION: FUNDAMENTALS

TABLE OF CONTENTS (Cont'd)

Mathematics - Vocationally Specific (pp. 115 to 120)

MATHEMATICS FOR AUTO MECHANICS
MATHEMATICS OF THE SHOP
MATH FOR THE AUTOMOTIVE TRADE
MICROMETERS, CALIPERS AND GAUGES
PRACTICAL PROBLEMS IN MATHEMATICS FOR AUTOMOTIVE TECHNICIANS
RELATED MATHEMATICS - AUTO BODY

Mathematics - Vocationally General (pp. 123 to 131)

BASIC MATHEMATICS FOR THE VOCATIONAL STUDENT
MATH
MATHEMATICS AT WORK: FRACTIONS
MATHEMATICS FOR CAREERS: ADDING AND SUBTRACTING WHOLE NUMBERS
MEASURING DEVICES AND INSTRUMENTS
VOCATIONAL AND TECHNICAL MATH IN ACTION (transparencies)
VOCATIONAL AND TECHNICAL MATH IN ACTION (text)
VOCATIONAL RELATED MATH
WORKING WITH MATH

# READING - VOCATIONALLY SPECIFIC

## Reading - Vocationally Specific Resources

TEXT: 1. Auto Body
2. Auto Service
Instructional Materials Laboratory
University of Missouri, Columbia, MO

| | |
|---|---|
| STATED OBJECTIVES | Yes |
| READING LEVEL | 4 |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | Yes |
| USES MORE THAN ONE LEARNING MODALITY | Yes - reading and listening |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Slides |
| TEACHERS' GUIDE | Yes |
| CONSTRUCTION | Paperback manuals |
| COST | 1. \$105.00<br>2. \$ 80.00 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

1. Six Auto Body audio-cassettes and 390 slides, plus instructor and student manuals
2. Five Auto Service audio-cassettes and 285 slides, plus instructor and student manuals

## Reading - Vocationally Specific Resource

TEXT: Auto Mechanics Vocabulary Skills: The Automatic Transmission, Prentice-Hall Media, Inc.
Tarrytown, NY 1983

| | |
|---|---|
| STATED OBJECTIVES | No |
| READING LEVEL | Not applicable |
| FREQUENT REVIEW | Yes |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | Yes |
| USES MORE THAN ONE LEARNING MODALITY | Listening, filmstrip |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | No |
| TEACHERS' GUIDE | Yes |
| CONSTRUCTION | Audio-cassette, filmstrip |
| COST | $89.00 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

Vocabulary only - Individualized or large group instruction. Also available, The Engine.

## Reading - Vocationally Specific Resource

TEXT: Automobile Maintenance (Reading and Language Activities)
William Kessman, Director of Vocational Education
State of New Jersey, Paramus, NJ

| | |
|---|---|
| STATED OBJECTIVES | No |
| READING LEVEL | 4 |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | No |
| USES MORE THAN ONE LEARNING MODALITY | Only reading |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Black/white cartoons |
| TEACHERS' GUIDE | No - (answer key) |
| CONSTRUCTION | Paperback; thick paper pages |
| COST | Not reported |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

Reading comprehension, vocabulary, spelling, word usage, word recognition, etc. related to tasks of a beginning auto mechanic student.

## Reading - Vocationally Specific Resource

TEXT: Basic Reading Instruction for Students in Automotive Mechanics
Educational Resources Information Center (ERIC)
Washington, D.C. 1971

| | |
|---|---|
| STATED OBJECTIVES | No |
| READING LEVEL | 6 |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | No |
| USES MORE THAN ONE LEARNING MODALITY | No |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | No |
| TEACHERS' GUIDE | No |
| CONSTRUCTION | Paperback |
| COST | $14.40 (plus shipment) |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

This is a student workbook which is based on sound-letter correspondence. It also includes exercises and some reading, and is only superficially related to auto mechanics.

## Reading - Vocationally Specific Resource

TEXT: Career Education (Automotive) 1976
Bond, Lash, Reynolds
Allied Educational Council
Galien, Michigan

| | |
|---|---|
| STATED OBJECTIVES | No |
| READING LEVEL | Not applicable |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | By pictures |
| USES MORE THAN ONE LEARNING MODALITY | No |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Yes |
| TEACHERS' GUIDE | No |
| CONSTRUCTION | Paperback |
| COST | Not reported |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

Auto mechanic vocabulary text.

## Reading - Vocationally Specific Resource

TEXT: Readings in the Automotive Trade 1977
Vocational Resource Venter
200 Old Matawan Road
Old Bridge, NJ 08857

| | |
|---|---|
| STATED OBJECTIVES | No |
| READING LEVEL | 10 |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | Yes |
| USES MORE THAN ONE LEARNING MODALITY | Reading, writing, speaking |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Black/white illustrations |
| TEACHERS' GUIDE | No |
| CONSTRUCTION | Paperback; thick paper pages |
| COST | |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

Vocabulary, reading, pronounciation, writing (mechanics).

## Reading - Vocationally Specific Resource

TEXT: SHOPTALK, The Automobile
Byron Alpers and Mitchel Afrcw
Allyn & Bacon, Inc.
Boston, MA 1978

| | |
|---|---|
| STATED OBJECTIVES | Yes |
| READING LEVEL | 5 |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | Yes |
| USES MORE THAN ONE LEARNING MODALITY | No |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Black/white photos |
| TEACHERS' GUIDE | Yes |
| CONSTRUCTION | Paperback |
| COST | $5.25 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

Seven chapters tied together by the story of a vocational school student and his subsequent employment experiences.

## Reading - Vocationally Specific Resource

TEXT: Tune Up 1, 2, 3
Lakeshore Curriculum Materials Center
Carson, CA 1979

| | |
|---|---|
| STATED OBJECTIVES | No |
| READING LEVEL | 5.5 - 6.5 |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | Introduced in readings |
| USES MORE THAN ONE LEARNING MODALITY | No |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Yes |
| TEACHERS' GUIDE | No |
| CONSTRUCTION | Paperback |
| COST | $1.95 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

A series of three books for "shade-tree" mechanics. Teaches regular car maintenance while building reading skills - sequenced according to level of difficulty.

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## READING - VOCATIONALLY GENERAL

## Reading - Vocationally General Resource

TEXT: Coordinated Vocational Education and Training
(Vocationally Related English), Spann,
State Department of Vocational and Technical Education
Stillwater, OK 1972

| | |
|---|---|
| STATED OBJECTIVES | Yes |
| READING LEVEL | 3 |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | No |
| USES MORE THAN ONE LEARNING MODALITY | Reading, writing |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | No |
| TEACHERS' GUIDE | No |
| CONSTRUCTION | Paperback |
| COST | Available on loan |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

Includes parts of speech, punctuation, application forms, safety rules, job interviews, and following directions. Poor print quality.

## Reading - Vocationally General Resource

TEXT: Do You Read Me? 1981
West Virginia Vocational Curriculum Lab
Ripley, West Virginia

| | |
|---|---|
| STATED OBJECTIVES | No |
| READING LEVEL | Not reported |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | No |
| USES MORE THAN ONE LEARNING MODALITY | No |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Drawings |
| TEACHERS' GUIDE | Yes |
| CONSTRUCTION | Paperback |
| COST | $10.00 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

General vocational, with one section each of auto mechanics and auto body.

## Reading - Vocationally General Resource

TEXT: Vocational English
Globe Book Company, Inc.
New York, NY 1975

| | |
|---|---|
| STATED OBJECTIVES | Yes |
| READING LEVEL | 7 - 8 |
| FREQUENT REVIEW | Unit tests |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | Yes |
| USES MORE THAN ONE LEARNING MODALITY | Also writing |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Drawings |
| TEACHERS' GUIDE | Yes |
| CONSTRUCTION | Paperback |
| COST | $4.00 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

Includes: Using a Dictionary, Communication, Expressing Yourself, Getting Along with People, Vocabulary, Writing Reports and Letters.

## Reading -- Vocationally General Resource

TEXT: You and Your Work
Alpers and Afrow
Allyn & Bacon, Inc.
Boston, MA 1978

| | |
|---|---|
| STATED OBJECTIVES | No |
| READING LEVEL | 8.5 |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | No |
| USES MORE THAN ONE LEARNING MODALITY | No |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Black and white photographs |
| TEACHERS' GUIDE | No |
| CONSTRUCTION | Paperback |
| COST | $5.25 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

Meant to be used with SHOP TALK.

# WRITING - VOCATIONALLY GENERAL

## Writing - Vocationally General Resource

TEXT: Adult Writing and Reading Experiences : (AWARE I)
Series F - (On the Job)
Morris & Birsner
EDL/McGraw Hill, NY 10020

| | |
|---|---|
| STATED OBJECTIVES | Yes |
| READING LEVEL | 2 - 3 |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | Yes<br>(vocabulary not read by student without guidance until final exercise) |
| USES MORE THAN ONE LEARNING MODALITY | Reading, writing, listening, speaking |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Yes (Samples of forms used at work) |
| TEACHERS' GUIDE | Yes |
| CONSTRUCTION | Paperback plus audio-cassette |
| COST | Not reported |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

Student records and evaluates own progress.

## Writing - Vocationally General Resource

TEXT: Applied Penmanship
Ferguson and Lyon
South-Western Publishing Co. 1976

| | |
|---|---|
| STATED OBJECTIVES | No |
| READING LEVEL | 14 |
| FREQUENT REVIEW | Tests |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | Not applicable |
| USES MORE THAN ONE LEARNING MODALITY | No |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Yes |
| TEACHERS' GUIDE | No |
| CONSTRUCTION | Paperback |
| COST | $2.85 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

Although the reading level is high, there isn't much actual reading. Includes writing numbers on ledger sheets, taking messages, writing letters, forms, orders, checks, and labels.

## Writing - Vocationally General Resource

TEXT: Writing for the World of Work, Ellen Kaplan
Educational Design, Inc.
47 W. 13th Street
New York, NY 10011
1982

| | |
|---|---|
| STATED OBJECTIVES | No |
| READING LEVEL | 4 |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | Yes |
| USES MORE THAN ONE LEARNING MODALITY | No |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Yes |
| TEACHERS' GUIDE | No |
| CONSTRUCTION | Paperback |
| COST | $3.95 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

Includes writing used to get a job, start a job, and for ordering, shipping and receiving.

## Writing - Vocationally General Resource

TEXT: Improve Your Writing for Job Success
Peterson Handwriting Co.
2215 Commerce Street
Dallas, TX 75201
1978

| | |
|---|---|
| STATED OBJECTIVES | No |
| READING LEVEL | 6 |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | No |
| USES MORE THAN ONE LEARNING MODALITY | No |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Yes |
| TEACHERS' GUIDE | No |
| CONSTRUCTION | Paperback |
| COST | $3.25 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

This is a penmanship book that includes forms, only one of which is vocationally related (an employment application).

# LISTENING & SPEAKING - VOCATIONALLY GENERAL

## Listening & Speaking - Vocationally General Resource

TEXT: Communicating at Work
Williams and Eggland
South-Western Publishing Co. 1979

| | |
|---|---|
| STATED OBJECTIVES | Yes |
| READING LEVEL | 8 |
| FREQUENT REVIEW | Yes |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | Yes |
| USES MORE THAN ONE LEARNING MODALITY | Writing, Listening, Speaking |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Many, in color |
| TEACHERS' GUIDE | Yes |
| CONSTRUCTION | Paperback student manual plus audio-cassette |
| COST | $5.58 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

Aimed at teaching communication competencies (oral and written) required on the job, especially by entry-level workers. Chapter 4, "Communicating with Customers" could be useful to an auto mechanic.

## Listening & Speaking - Vocationally General Resource

TEXT: The Business of Oral Communication: Fundamentals
(Module 1) Gwyn, Gwyn and Sander
South-Western Publishing Company
Cincinnati, OH 1980

| | |
|---|---|
| STATED OBJECTIVES | No |
| READING LEVEL | 5 |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | No |
| USES MORE THAN ONE LEARNING MODALITY | Listening, Speaking |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Yes |
| TEACHERS' GUIDE | No |
| CONSTRUCTION | Paperback study guide plus audio-cassettes |
| COST | Study Guide $ 2.43<br>Audio Cassettes $340.00 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

·Although not truly vocational, there are two sections on conversation at work. Unit 3 is Listening, and includes non-verbal signs.

# MATHEMATICS - VOCATIONALLY SPECIFIC

## Mathematics - Vocationally Specific Resource

TEXT: Mathematics for Auto Mechanics
Hendrix and LaFevor
Delmar Publishing Company
Albany, NY 1978

| | |
|---|---|
| STATED OBJECTIVES | Yes |
| READING LEVEL | 13 |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | No |
| USES MORE THAN ONE LEARNING MODALITY | Reading practical problems |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Yes |
| TEACHERS' GUIDE | Yes |
| CONSTRUCTION | Paperback |
| COST | $7.50 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

Includes all basic math skills.

## Mathematics - Vocationally Specific Resource

TEXT: Mathematics of the Shop
McMakin, Shoner, Weber, Smith
Delmar Publishing Company
Albany, NY 1978

| | |
|---|---|
| STATED OBJECTIVES | No |
| READING LEVEL | 10 |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | No |
| USES MORE THAN ONE LEARNING MODALITY | No |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Many |
| TEACHERS' GUIDE | No |
| CONSTRUCTION | Hardback |
| COST | $11.25 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

Auto mechanics is one of four shop areas included.

## Mathematics - Vocationally Specific Resource

TEXT: Math for the Automotive Trade, Peterson/DeKryger,
South-Western Publishing Company
Palo Alto, CA

| | |
|---|---|
| STATED OBJECTIVES | No |
| READING LEVEL | 7 (Practical problems) |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | No |
| USES MORE THAN ONE LEARNING MODALITY | No |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Yes |
| TEACHERS' GUIDE | No |
| CONSTRUCTION | Paperback |
| COST | $3.95 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

An excellent book that links math with specific tasks in the automotive industry.

## Mathematics - Vocationally Specific Resource

TEXT: Micrometers, Calipers and Gauges
Instructional Materials Laboratory
University of Missouri
Columbia, MO 1969

| | |
|---|---|
| STATED OBJECTIVES | No |
| READING LEVEL | 8 |
| FREQUENT REVIEW | Yes |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | No |
| USES MORE THAN ONE LEARNING MODALITY | Reading, practical problems |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Black/white photos and drawings |
| TEACHERS' GUIDE | No |
| CONSTRUCTION | Stapled text (16 pages) plus transparency masters |
| COST | Stapled text $2.00<br>Transparencies $3.25 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Sex-biased |

## Mathematics - Vocationally Specific Resource

TEXT: Practical Problems in Mathematics for Automotive Technicians, George Moore,
Delmar Publishing Company
Albany, NY 1979

| | |
|---|---|
| STATED OBJECTIVES | Yes |
| READING LEVEL | 7 |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | No |
| USES MORE THAN ONE LEARNING MODALITY | No |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | No |
| TEACHERS' GUIDE | No |
| CONSTRUCTION | Paperback |
| COST | $5.25 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

Provides real problems encountered in auto mechanics. Includes all math skills needed by auto mechanics, plus copies of repair orders, shop tickets and estimates.

To be used with Basic Math Simplified.

## Mathematics - Vocationally Specific Resource

TEXT: Related Mathematics - Auto Body (Vols. I and II),
Porroni,
The New Jersey Vocational Technical Curriculum Laboratory

| | |
|---|---|
| STATED OBJECTIVES | Yes |
| READING LEVEL | 8 - 10 |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | No |
| USES MORE THAN ONE LEARNING MODALITY | Reading |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Black/white cartoons and drawings, plus graphs |
| TEACHERS' GUIDE | No |
| CONSTRUCTION | Looseleaf |
| COST | $5.00 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

Vol. I - Math Principles using Auto Body context
Vol. II - Business Aspects of Auto Body trade

# MATHEMATICS - VOCATIONALLY GENERAL

Mathematics - Vocationally General Resource

TEXT: Basic Mathematics for the Vocational Student
Instructional Materials Laboratory
Ohio State University
Columbus, OH 1981

| | |
|---|---|
| STATED OBJECTIVES | No |
| READING LEVEL | Not applicable |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | No |
| USES MORE THAN ONE LEARNING MODALITY | No |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | No |
| TEACHERS' GUIDE | No |
| CONSTRUCTION | Paperback, 8½" x 11" |
| COST | $4.50 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

Basic math and metrics, square roots, geometry, use of a protractor, and ratios.

## Mathematics - Vocationally General Resource

TEXT: Math, Caleb Crowell
Education Design, Inc.
47 W. 13 Street
New York, NY 10011
1982

| | |
|---|---|
| STATED OBJECTIVES | No |
| READING LEVEL | 6 |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | No |
| USES MORE THAN ONE LEARNING MODALITY | No |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Yes |
| TEACHERS' GUIDE | No |
| CONSTRUCTION | Paperback |
| COST | $3.95 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

The first two sections are "measuring".

## Mathematics - Vocationally General Resource

TEXT: Mathematics at Work: Fractions, Singer
Mc-Graw Hill Publishing Company
Highstown, NJ 1977

| | |
|---|---|
| STATED OBJECTIVES | No |
| READING LEVEL | Not applicable |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | Yes |
| USES MORE THAN ONE LEARNING MODALITY | No |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Yes |
| TEACHERS' GUIDE | No (answer key) |
| CONSTRUCTION | Paperback |
| COST | Paperback manual $3.96<br>Answer key $1.56 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Possible racial stereotyping |

COMMENTS:

Another workbook in the series is Decimals.

## Mathematics - Vocationally General Resource

TEXT: Mathematics for Careers: Adding and Subtracting Whole Numbers
Delmar Publishing Company
Albany, NY
1981

| | |
|---|---|
| STATED OBJECTIVES | No |
| READING LEVEL | Not applicable |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | Not applicable |
| USES MORE THAN ONE LEARNING MODALITY | No |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | No |
| TEACHERS' GUIDE | Yes |
| CONSTRUCTION | Paperback |
| COST | Text $2.85<br>Teachers' Guide 2.75 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

## Mathematics - Vocationally General Resource

TEXT: Measuring Devices and Instruments, Justus,
ESP, Inc.
Jonesboro, AR

| | |
|---|---|
| STATED OBJECTIVES | Yes |
| READING LEVEL | 5 |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | Not applicable |
| USES MORE THAN ONE LEARNING MODALITY | No |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Yes |
| TEACHERS' GUIDE | Yes |
| CONSTRUCTION | Paperback |
| COST | $4.00 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

Set of 24 duplicating masters, including Fuel Gauge; Micrometer; Calipers, Inside and Outside.

Mathematics - Vocationally General Resources

TEXT: Vocational and Technical Math in Action
United Transparencies, Inc.
Binghamton, NY 1979

| | |
|---|---|
| STATED OBJECTIVES | Not applicable |
| READING LEVEL | Not applicable |
| FREQUENT REVIEW | Not applicable |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | Not applicable |
| USES MORE THAN ONE LEARNING MODALITY | No |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Yes |
| TEACHERS' GUIDE | Yes |
| CONSTRUCTION | 50 transparencies |
| COST | $10[illegible].88 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

Transparencies that could be used with any vocational math text.

## Mathematics - Vocationally General Resources

TEXT: Vocational and Technical Math In Action
Hayden Book Company
Rochelle Park, NJ
1969

| | |
|---|---|
| STATED OBJECTIVES | No |
| READING LEVEL | 12 |
| FREQUENT REVIEW | Problem set at end of book |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | Not applicable |
| USES MORE THAN ONE LEARNING MODALITY | No |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Photographs |
| TEACHERS' GUIDE | No |
| CONSTRUCTION | Paperback |
| COST | Not reported |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

May be used with transparencies mentioned on previous page.

## Mathematics - Vocationally General Resources

TEXT: Vocational Related Math
Spann, 1972
Stillwater, OK

| | | |
|---|---|---|
| STATED OBJECTIVES | Yes | |
| READING LEVEL | 7 | |
| FREQUENT REVIEW | No | |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | No | |
| USES MORE THAN ONE LEARNING MODALITY | No | |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Yes | |
| TEACHERS' GUIDE | Yes | |
| CONSTRUCTION | For placement in looseleaf (3-hole punched) | |
| COST | Student | $14.00 |
| | Teachers' Guide | 17.00 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes | |

COMMENTS:

Includes measurement, whole numbers, fractions, decimals, percents, consumer education and geometry.

## Mathematics - Vocationally General Resource

TEXT: *Working with Math*, Sushok and Shapiro,
The New Jersey Vocational Technical Curriculum Laboratory
Rutgers State University
New Brunswick, NJ 1976

| | |
|---|---|
| STATED OBJECTIVES | Yes |
| READING LEVEL | 4 |
| FREQUENT REVIEW | No |
| VOCABULARY CAREFULLY INTRODUCED AND DEFINED | Not applicable |
| USES MORE THAN ONE LEARNING MODALITY | Verbal and hands-on |
| ILLUSTRATIONS APPEALING, REALISTIC, CONTEMPORARY | Yes |
| TEACHERS' GUIDE | Yes |
| CONSTRUCTION | Looseleaf |
| COST | Student manual $6.75<br>Teachers' guide $8.25 |
| AVOIDS RACIAL, CULTURAL, SEXUAL STEREOTYPES | Yes |

COMMENTS:

Each student must have measuring tools and other devices as stated in the book. For vocational math students who are non-readers.

## Section V

# Review of Assessment Resources

## Review of Assessment Resources

### INTRODUCTION

The development of assessments usually comes after and lags considerably behind the development of instructional materials. The vocationally related basic skills area is no exception. Vocationally specific or vocationally general basic skills assessments are virtually non-existent. Fewer than ten assessments were found when the assessment search was limited to those two categories.

For this reason, the search for basic skills assessments at a secondary or post-secondary level was broadened to include a "Life Skills" category (i.e., adult living skills). There are many more of the life skill-type than the vocational-type assessments. The content of these is somewhat related although the context is distinct.

When the basic skills included in the assessment dealt with the basic skills determined by local industry to be important on the job, the assessment was included in the review section despite its life skills orientation as a "something is better than nothing" option. The listening and speaking assessment area posed a somewhat different problem.

Surveying the listening and speaking assessment resources which exist, it was evident that more had been done in listening and speaking assessment on a secondary and college level than vocationally or in life skills. The school assessments were, of course, oriented to classroom oral communication skills. Telephone calls made to the International Listening Association and the Speech Communication Association revealed that no listening or speaking assessments which are vocational in orientation have been developed, nor is there anything in the planning stages. Therefore, it became necessary to include in the listening and speaking reviews those assessments which are "classroom" in orientation with the thought that they may be adaptable and generalizable to vocational basic skills training.

## Assessment Resources

## TABLE OF CONTENTS

Vocationally-Specific (pp. 141 to 142)

AUTO MECHANICS: SKILLS CHECK (measures Reading and Math)
DIAGNOSTIC READING SURVEY

Vocationally-General (pp. 145 to 152)

BASIC SKILLS ASSESSMENT (measures Reading and Writing)
SURVEY OF BASIC SKILLS (measures Reading, Writing and Math)
INDUSTRIAL READING TEST
PERFORMANCE ASSESSMENT IN READING
TESTS OF EVERYDAY WRITING SKILLS

Functional Life Skills (pp. 155 to 180)

COMPREHENSIVE TESTS OF BASIC SKILLS (measures Reading and Math)
ADULT PERFORMANCE LEVEL SURVEY (measures Reading and Math)
SRA ACHIEVEMENT SERIES (measures Reading and Math)
MINIMUM ESSENTIALS TEST (measures Reading, Writing and Math)
MINNESOTA READING ASSESSMENT
EVERYDAY SKILLS TEST (measures Reading)
CALIFORNIA ACHIEVEMENT TEST (measures Reading and Math)
SRA READING RECORD
THE STECK-VAUGHN PLACEMENT SURVEY FOR ADULTS BASIC EDUCATION (measures Reading and Math)
BRIGANCE DIAGNOSTIC INVENTORY OF ESSENTIAL SKILLS (measures Writing)
THE MASSACHUSETTS BASIC SKILLS ASSESSMENT OF LISTENING AND SPEAKING (measures Listening and Speaking)
STANDARD DIAGNOSTIC MATH TEST
GENERAL EDUCATIONAL PERFORMANCE INDEX (measures Math)
STANFORD ACHIEVEMENT TEST (measures Math)
TEST OF PERFORMANCE IN COMPUTATIONAL SKILLS (measures Math)
ASSESSMENT SKILLS IN COMPUTATION (measures Math)
TEST OF ADULT BASIC EDUCATION (measures Math)
ADULT BASIC LEARNING EXAMINATION (measures Math)

Classroom Skills (pp. 183 to 187)

BROWN-CARLSEN LISTENING COMPREHENSION TEST
ST. EDWARDS VIDEO TEST - PRE AND POST (measures Listening)
DOW LISTENING TEST
MICHIGAN EDUCATIONAL ASSESSMENT PROGRAM (measures Listening)
COMMUNICATION COMPETENCY ASSESSMENT INSTRUMENT (measures Speaking)

# VOCATIONALLY SPECIFIC ASSESSMENTS

TITLE: Auto Mechanics: Skills Check

## Reviewers' Test Item Analysis

READING SKILL(S) ITEMS APPEAR TO ASSESS

Some reading to find specific information, some reading between the lines, some reading to relate new material to prior knowledge, some referencing (index and graph)

MATH SKILL(S) ITEMS APPEAR TO ASSESS

Whole numbers, fractions, decimals, percentage, practical word problems, ratio, geometry

| | |
|---|---|
| ITEM ORIENTATION: | |
| Auto Mechanics/Auto Body | Auto Mechanics |
| Vocational General | No |
| Functional, Life Skills | No |
| LEVEL(S) OF ITEM DIFFICULTY | High |
| NUMBER OF ITEMS | 50 - Reading<br>38 - Math |

## General Information from Examination Copy

DEVELOPER NAME AND ADDRESS
Renton Vocational Technical Institute
Renton School District No. 403
3000 N.E. Fourth Street
Renton, WA 98055

DEVELOPER DESCRIPTION
One of thirteen pre-entry criterion referenced skills checks and subsequent diagnosis of areas in need of remediation: reading, vocabulary and math

COST
Not reported

ALTERNATE FORMS
Not reported

PROJECT DATE(S)
1974 - 1976

SCORING
Hand - with answer key

ADMINISTRATION
Group or individual; explain general procedure aloud

MINUTES REQUIRED
Untimed

REPORTING FORMAT
Individual student scores, frequency distribution

RELIABILITY
Not available in Examiner Manual

VALIDITY
Content to be determined by user

TITLE: Diagnostic Reading Survey
(last 15 pages of text, Math for Auto Mechanics, which was reviewed in Section IV)

## Reviewers' Test Item Analysis

READING SKILL(S) ITEMS APPEAR TO ASSESS
Vocabulary; spelling; chart, table, index or diagram reading; finding facts and information; following directions; finding main idea

| | |
|---|---|
| ITEM ORIENTATION: | |
| Auto Mechanics/Auto Body | Yes |
| Vocational General | No |
| Functional, Life Skills | No |
| LEVEL(S) OF ITEM DIFFICULTY | Moderate |
| NUMBER OF ITEMS | 45 |

## General Information from Examination Copy

DEVELOPER NAME AND ADDRESS
Delmar Publishing Company
50 Wolf Road
Albany, NY 12205

PUBLISHER/DEVELOPER DESCRIPTION
Diagnostic survey

COST
$7.50

ALTERNATE FORMS
No

COPYRIGHT DATE(S)
1978

SCORING
Hand - with answer key

ADMINISTRATION
Group or individual;
oral administration
General directions to be read aloud for each sub-test

MINUTES REQUIRED
60

REPORTING FORMAT
Raw score

RELIABILITY
Not available in Examiner Manual

VALIDITY
Not available in Examiner Manual

# VOCATIONALLY GENERAL ASSESSMENTS

TITLE: Basic Skills Assessment

## Reviewers' Test Item Analysis

READING SKILL(S) ITEMS APPEAR TO ASSESS
A lot of reading to find specific information, reading to draw conclusions, reading to relate new material to prior knowledge

ITEM ORIENTATION:

| | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | Some |
| Functional, Life Skills | Yes |
| LEVEL(S) OF ITEM DIFFICULTY | Moderate |
| NUMBER OF ITEMS | 65 - Reading |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS
Educational Testing Service
Addison-Wesley Testing Service
2725 Sand Hill Road
Menlo Park, CA 94025

PUBLISHER DESCRIPTION
Performance in basic skills of reading, writing, math, and functional literacy

COST

| | |
|---|---|
| Test booklets (35) | $21.00 |
| Answer sheets (100) | 13.00 |
| Scoring stencils | 3.55 |

ALTERNATE FORMS
Forms A, B and C

COPYRIGHT DATE(S)

1981

SCORING

Machine, hand - with stencil

ADMINISTRATION
Individual or group; general directions read aloud for each of three subtests + writing sample

MINUTES REQUIRED
45 minutes for each subtest

REPORTING FORMAT
Raw scores, standard scores cut score to be established by user

RELIABILITY
Kuder-Richardson 20
.73 - .95

VALIDITY

Test based on information from schools, professional organizations, research, and relevant material from other testing programs (need technical manual for specifics)

TITLE: Survey of Basic Skills

## Reviewers' Test Item Analysis

READING SKILL(S) ITEMS APPEAR TO ASSESS
A lot of reading in order to draw conclusions and reading to relate new material to prior knowledge, some reading to find specific information and a little reading in order to solve problems

ITEM ORIENTATION:

| | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | Items developed in reference to research which determined "generic" vocational skills |
| Functional, Life Skills | Some |

| | |
|---|---|
| LEVEL(S) OF ITEM DIFFICULTY | Moderate - hign |
| NUMBER OF ITEMS | 18 - Reading |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS
Cornell Institute for Occupational Education, New York State College, Cornell University, Ithaca, NY 14853

PUBLISHER DESCRIPTION
Competency in basic skills of math, language and reading

COST
Booklet $1.35

ALTERNATE FORMS
No

COPYRIGHT DATE(S)
1981

SCORING
Machine

ADMINISTRATION
Group or individual; general instructions read aloud for each section

MINUTES REQUIRED
Untimed

REPORTING FORMAT
Scored by Cornell; total score, subscale scores, user norms can be calculated, diagnostic scores

RELIABILITY
Not available in Examiner Manual

VALIDITY
Canadian generic basic skills research used in determining content

TITLE: Industrial Reading Test

## Reviewers' Test Item Analysis

READING SKILL(S) ITEMS APPEAR TO ASSESS

Some reading to find specific information, some reading in order to draw conclusions and reading to relate new material to prior knowledge, a little critical reading

ITEM ORIENTATION:

| | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | Yes |
| Functional, Life Skills | No |

LEVEL(S) OF ITEM DIFFICULTY High (Technical Vocabulary)

TOTAL NUMBER OF ITEMS 38

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS

The Psychological Corporation
1001 Polk Street
San Francisco, CA 94109

PUBLISHER DESCRIPTION

Measure of reading ability developed for use in industry and vocational schools, ability to comprehend written technical materials

COST

| | |
|---|---|
| Test booklets (25) | $10.00 |
| Manual | 2.85 |
| Answer Sheet (50) | 5.75 |
| Answer Key | 1.75 |

ALTERNATE FORMS

Forms A and B (Form B only available to schools)

COPYRIGHT DATE(S)

1978

SCORING

Machine, hand - with key

ADMINISTRATION

Individual and group, general directions to be read aloud

MINUTES REQUIRED

40 minutes

REPORTING FORMAT

Raw score, percentile for various groups including Skills Center and adult remedial students

RELIABILITY

Alternate form and split-half reliability .75 - .92
Standard error of measurement .20 - 3.8

VALIDITY

Content - based on training manuals students would encounter in their training

TITLE: Performance Assessment in Reading

## Reviewers' Test Item Analysis

READING SKILL(S) ITEMS APPEAR TO ASSESS

Some reading to find specific information, (including a referencing section), reading in order to draw conclusions and to relate new material to prior knowledge, some reading in order to solve problems, a little reading to follow directions and reading critically

| ITEM ORIENTATION: | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | Some |
| Functional, Life Skills | Yes |

LEVEL(S) OF ITEM DIFFICULTY — Moderately high

NUMBER OF ITEMS — 72 - Reading

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS
CTB/McGraw Hill
Del Monte Research Park
Monterey, CA 93940

PUBLISHER DESCRIPTION
Identification of learners' needs in basic reading skills and instructional prescriptions referenced to those skills

| COST | |
|---|---|
| Reusable test booklets (35) | $20.65 |
| Answer sheets (25) | 5.00 |

ALTERNATE FORMS
No

COPYRIGHT DATE(S)
Not reported

SCORING
Self-scoring answer sheet

ADMINISTRATION
Individual or group, administration

MINUTES REQUIRED
Untimed

REPORTING FORMAT
User sets own cut scores

RELIABILITY
Not available in Examiner Manual

VALIDITY
Not available in Examiner Manual

TITLE: Tests of Everyday Writing Skills (TEWS)

## Reviewers' Test Item Analysis

WRITING SKILL(S) ITEMS APPEAR TO ASSESS

A lot of items on correct punctuation, some on correct spelling, some writing sentences

ITEM ORIENTATION:

| | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | A few |
| Functional, Life Skills | Yes |

| | |
|---|---|
| LEVEL(S) OF ITEM DIFFICULTY | Moderately High (high school) |
| TOTAL NUMBER OF ITEMS | 100 |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS

CTB/McGraw Hill
Del Monte Research Park
Monterey, CA 93940

PUBLISHER DESCRIPTION

Competency test in writing or composition skills that apply to everyday life situations. Objective section and writing sample.

COST

Not reported

ALTERNATE FORMS

Not presently available

COPYRIGHT DATE(S)

1978

SCORING

Machine, hand - with stencil

ADMINISTRATION

Individual or group; general directions to be read aloud for each of three subtests

MINUTES REQUIRED

Untimed; examinees should be given an opportunity to attempt all items

REPORTING FORMAT

Develop own cut scores

RELIABILITY

No information in Examiner Manual

VALIDITY

No information in Examiner Manual

TITLE: Basic Skills Assessment

## Reviewers' Test Item Analysis

WRITING SKILL(S) ITEMS APPEAR TO ASSESS

Conceptual representation of recording work on a work order, filling out forms, writing complaints

| ITEM ORIENTATION: | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | Yes |
| Functional, Life Skills | Yes |
| LEVEL(S) OF ITEM DIFFICULTY | Moderate |
| NUMBER OF ITEMS | 75 + writing sample |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS
Educational Testing Service
Addison-Wesley Testing Service
2725 Sandhill Road
Menlo Park, CA 94025

PUBLISHER DESCRIPTION
Performance in basic skills of reading, writing, math, functional literacy; grades 7-12

COST

| | |
|---|---|
| Test booklets (35) | $21.00 |
| Answer sheets (100) | 13.00 |
| Scoring stencil | 3.55 |

COPYRIGHT DATE(S)
1981

SCORING
Machine, hand with stencil

ADMINISTRATION
Individual or group; general directions to be read aloud for each of three subtests + writing sample

MINUTES REQUIRED
45 for each sub-test

REPORTING FORMAT
Raw scores, standard scores (cut scores to be established by user)

ALTERNATE FORMS
Forms A, B, C

RELIABILITY
Kuder-Richardson 20
.73 - .95

VALIDITY
Test based on information from schools, professional organizations, research and relevant material from other testing programs (technical manual needed for specifics)

TITLE: Survey of Basic Skills: Language Arts

## Reviewers' Test Item Analysis

WRITING SKILL(S) ITEMS APPEAR TO ASSESS

Some punctuation, some use of alphabetic ordering, a little indirect measure of sentence writing

| ITEM ORIENTATION: | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | Yes |
| Functional, Life Skills | Yes |
| LEVEL(S) OF ITEM DIFFICULTY | Medium to high |
| NUMBER OF ITEMS | 36 |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS
Cornell Institute for Occupational
Education, New York State College,
Cornell University
Ithaca, NY 14853

PUBLISHER DESCRIPTION
Competency in basic skills of math, language, and diagnostic reading, for adults

| COST | |
|---|---|
| Booklet | $1.35 |

ALTERNATE FORMS
No

COPYRIGHT DATE(S)
1981

SCORING
Machine

ADMINISTRATION
Group or individual; general directions to be read aloud for each sub-test

MINUTES REQUIRED
Untimed

REPORTING FORMAT
Scored by Cornell; total score, sub-scale scores, user norms can be calculated, diagnostic scores

RELIABILITY
Not available in Examiner Manual

VALIDITY
Canadian generic basic skills research used in determining content.

TITLE: Survey of Basic Skills: Math

## Reviewers' Test Item Analysis

MATH SKILL(S) ITEMS APPEAR TO ASSESS

Whole numbers, a little measurement, fractions, decimals, percentages, geometric formulas and algebra

ITEM ORIENTATION:

| | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | Items developed based on research which determined "generic" vocational math skills; no word problems |
| Functional, Life Skills | No |
| LEVEL(S) OF ITEM DIFFICULTY | Low - Moderate |
| NUMBER OF ITEMS | 60 - Math |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS

Cornell Institute for Occupational
Education, New York State College,
Cornell University
Ithaca, NY 14853

PUBLISHER DESCRIPTION

Competency in basic skills of math, language, and diagnostic reading, for adults

COST

Booklet $1.35

ALTERNATE FORMS

No

COPYRIGHT DATE(S)

1981

SCORING

Machine

ADMINISTRATION

Group or individual; general directions to be read aloud for each of eight sub-tests

MINUTES REQUIRED

Untimed

REPORTING FORMAT

Scored by Cornell; total score, sub-scale scores, user norms can be calculated, diagnostic scores

RELIABILITY

Split-half .97 for Math Test

VALIDITY

Complete domain of functional competencies covered in math (72 objectives)

LIFE SKILLS ASSESSMENTS

TITLE: Comprehensive Test of Basic Skills (CTBS)

## Reviewers' Test Item Analysis

READING SKILL(S) ITEMS APPEAR TO ASSESS

Some reading to find specific information (including reference skills), reading to draw conclusions, reading to relate new material to prior knowledge

| ITEM ORIENTATION: | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | Yes |
| Functional, Life Skills | Yes |

| | |
|---|---|
| LEVEL(S) OF ITEM DIFFICULTY | Low - High |
| NUMBER OF ITEMS | 110 - Reading |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS
CTB/McGraw Hill
10450 South Pioneer Blvd. #5
Santa Fe Springs, CA 90670

PUBLISHER DESCRIPTION
Norm-referenced, objective-based measure of basic skills achievement, criterion-referenced: reading, writing, language, math, reference skills

| COST | |
|---|---|
| Reusable Test Booklets (35) | $35.70 |
| Answer Sheets (50) | 10.50 |
| Stencils | 4.75 |

ALTERNATE FORMS
Forms U and V

COPYRIGHT DATE(S)
1981, 1982, 1983

SCORING
Machine, hand with stencils, or self-scoring

ADMINISTRATION
Group or individual; general directions to be read aloud for each of eight sub-tests

| MINUTES REQUIRED | |
|---|---|
| Reference | 15 |
| Reading Comprehension | 40 |
| Vocabulary | 20 |

REPORTING FORMAT
Raw score, scaled score, percentile rank, stanine, grade equivalent

RELIABILITY
Not available in Examiner Manual

VALIDITY
Not available in Examiner Manual

TITLE: Adult Performance Level Survey (APL)

## Reviewers' Test Item Analysis

READING SKILL(S) ITEMS APPEAR TO ASSESS

A lot of reading to relate new material to prior knowledge, reading in order to solve problems, referencing, some reading to find specific information and reading to draw conclusions

ITEM ORIENTATION:

| | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Functional, Life Skills | Yes |

| | |
|---|---|
| LEVEL(S) OF ITEM DIFFICULTY | Moderate |
| NUMBER OF ITEMS | 40 - Reading |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS
The American College Testing Program
26 Garden Center, Suite 3 C
Broomfield, CO 80020

PUBLISHER DESCRIPTION
Achievement and functional competency of adults, identification of facts and terms, reading, writing, computation, problem solving, community resources, occupational knowledge, consumer economics, health, government and law.

COST
In public domain

COPYRIGHT DATE(S)
1976 (after 3/15/81 in public domain)

SCORING
Hand with answer key, self-scoring

ADMINISTRATION
Individual or group administration, general directions read aloud

MINUTES REQUIRED
Untimed

ALTERNATE FORMS
No

REPORTING FORMAT
Raw score, percentages

RELIABILITY
Kuder-Richardson 20 .52-.87
split half .53-.87

VALIDITY
Content validity based on University of Texas research

TITLE: SRA Achievement Series

## Reviewers' Test Item Analysis

READING SKILL(S) ITEMS APPEAR TO ASSESS

Some reading to find specific information, reading in order to draw conclusions and to relate new material to prior knowledge, a little reading in order to solve problems and reading critically, reference skills

ITEM ORIENTATION:

| | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | Some (in items of higher difficulty) |
| Functional, Life Skills | Yes |

LEVEL(S) OF ITEM DIFFICULTY Low to high

NUMBER OF ITEMS 130 - Reading

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS

Science Research Associates
155 N. Walker Drive
Chicago, IL 60606

PUBLISHER DESCRIPTION

Achievement in reading, math, language arts, reference materials, social studies and science

COST

| | |
|---|---|
| Test booklets (25) | $28.00 |
| Answer sheets (100) | 20.95 |

COPYRIGHT DATE(S)

1978

SCORING

Machine, hand

ADMINISTRATION

Individual or group, general directions read aloud for each sub-test

MINUTES REQUIRED

| | |
|---|---|
| Reading | 50 |
| Reference | 25 |

REPORTING FORMAT

Not available in Examiner Manual

ALTERNATE FORMS

Forms 1 and 2

RELIABILITY

Not available in Examiner Manual

VALIDITY

Not available in Examiner Manual

TITLE: Minimum Essentials Test

## Reviewers' Test Item Analysis

READING SKILL(S) ITEMS APPEAR TO ASSESS

Some reading to find specific information, to draw conclusions, and to solve problems, referencing, much reading to relate new material to prior knowledge

ITEM ORIENTATION:

| | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Functional, Life Skills | One section |

LEVEL(S) OF ITEM DIFFICULTY High

NUMBER OF ITEMS 74 - Reading

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS

Scott Foresman & Company
1900 East Lake Ave
Glenview, IL 60025

PUBLISHER DESCRIPTION

Test to measure minimum competency and basic skills in reading, mathematics, writing and life skills

COST

| | | |
|---|---|---|
| Test booklets | (35) | $24.85 |
| Answer sheets | (35) | 7.95 |

ALTERNATE FORMS

Forms A, B and C available

COPYRIGHT DATE(S)

1981

SCORING

Machine, hand with answer key

ADMINISTRATION

Individual or group; general directions read aloud for each sub-test

MINUTES REQUIRED

| | |
|---|---|
| Basic Skills | 45 |
| Life Skills | 45 |
| Writing (optional) | 20 |

REPORTING FORMAT

Raw score, percent correct; national percentile ranks reported for hand-scoring method

RELIABILITY

Not available in Examiner Manual

VALIDITY

Not available in Examiner Manual

TITLE: Minnesota Reading Assessment

## Reviewers' Test Item Analysis

READING SKILL(S) ITEMS APPEAR TO ASSESS

A lot of reading to find specific information, draw conclusions; a little reading to relate new material to prior knowledge

ITEM ORIENTATION:

| | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Functional, Life Skills | Some |
| LEVEL(S) OF ITEM DIFFICULTY | High |
| NUMBER OF ITEMS | 90 - Reading |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS

Twin Oak Publishing, Inc.
134 Mason Street
Rehobath, MA 02769

PUBLISHER DESCRIPTION

Competencies in reading relevant to school success with vocational and technical applicability

COST

| | |
|---|---|
| Reusable test booklets (25) | $12.50 |
| Stencil for hand scoring | 3.50 |
| Self-scoring answer sheet (50) | 9.95 |
| Hand-scoring answer sheet (50) | 7.95 |

ALTERNATE FORMS

Forms A and B

COPYRIGHT DATE(S)

1980

SCORING

Hand with answer key, self-scoring

ADMINISTRATION

Individual or group; general directions read aloud for each sub-test

MINUTES REQUIRED

| | |
|---|---|
| Reading Rate & Retention | 15 |
| Vocabulary | 10 |
| Paragraph Comprehension | 15 |

REPORTING FORMAT

Raw score, percentile score approx. grade equivalent data also available

RELIABILITY

.90-.94 Kuder-Richardson 20
Cronback's Horst Modified
No interform

VALIDITY

Criterion-related to
Nelson-Denny R .79
McGraw Hill Basic Skills
Reading Tests .72 and .82

TITLE: Everyday Skills Test

## Reviewers' Test Item Analysis

READING SKILL(S) ITEMS APPEAR TO ASSESS

A lot of reading to find specific information, to relate new material to prior knowledge, referencing and graphs; some reading to draw conclusions, a little reading in order to solve problems, reading critically

ITEM ORIENTATION:

| | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Functional, Life Skills | Yes |

| | |
|---|---|
| LEVEL(S) OF ITEM DIFFICULTY | Moderate |
| NUMBER OF ITEMS | 95 - Reading |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS
CTB/McGraw Hill
Del Monte Research Park
Monterey, CA 93940

PUBLISHER DESCRIPTION

Criterion-referenced tests in the basic skills of reading and math required in everyday life; norm-referenced, tests use of graphics, reference material, and math computation

COST

| | |
|---|---|
| Reusable test booklets (35) | $12.25 |
| Scoring stencils | 3.25 |
| Answer sheets (50) | 5.00 |

ALTERNATE FORMS

No

COPYRIGHT DATE(S)

1969, 1973, 1975

SCORING

Machine, or hand scoring with stencil

ADMINISTRATION

Individual or group, general directions read aloud for each sub-test

MINUTES REQUIRED

Part timed*, part untimed

* (Reading B - 30 min.)

REPORTING FORMAT

Set own criterion for mastery of criterion-referenced tests. Norm-referenced tests have grade equivalent conversions.

RELIABILITY

Not available in Examiner Manual

VALIDITY

Not available in Examiner Manual

## LIFE SKILLS ASSESSMENT ------ READING

TITLE: California Achievement Test (CAT)

### Reviewers' Test Item Analysis

READING SKILL(S) ITEMS APPEAR TO ASSESS

Some reading to find specific information, including referencing (tables, dictionary, map, guide), some reading to draw conclusions, to relate new material to prior knowledge, and reading critically

ITEM ORIENTATION:

| | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Functional, Life Skills | Some |

| | |
|---|---|
| LEVEL(S) OF ITEM DIFFICULTY | Low to high (locator test required) |
| NUMBER OF ITEMS | 95 - Reading |

### General Information from Examination Copy

PUBLISHER NAME AND ADDRESS
CTB/McGraw Hill
Del Monte Research Park
Monterey, CA 93940

ADMINISTRATION
Individual or group, general directions read aloud for each sub-test

PUBLISHER DESCRIPTION
Norm-referenced and criterion-referenced

MINUTES REQUIRED

| | |
|---|---|
| Reading | 45 |
| Reference | 25 |

COST

| | |
|---|---|
| Reusable test booklets (35) | $36.05 |
| Self-scoring answer sheets (25) | 8.00 |

REPORTING FORMAT
Raw score, grade equivalent, scaled score, percentile rank, stanine

ALTERNATE FORMS
Forms C and D

COPYRIGHT DATE(S)
1977, 1978 (revised from 1970)

RELIABILITY
Not available in Examiner Manual

SCORING
Machine, hand scoring with stencil, self-scoring

VALIDITY
Not available in Examiner Manual

TITLE: SRA Reading Record

## Reviewers' Test Item Analysis

READING SKILL(S) ITEMS APPEAR TO ASSESS

Some reading to find specific information, in order to draw conclusions and to relate new material to prior knowledge, a little reading in order to reference (advertisement charts, graphs, indexes, etc.)

| | |
|---|---|
| ITEM ORIENTATION: | |
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Functional, Life Skills | Some |
| LEVEL(S) OF ITEM DIFFICULTY | Moderately high - High |
| NUMBER OF ITEMS | 106 - Reading |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS
Science Research Associates
259 East Erie Street
Chicago, IL 60611

PUBLISHER DESCRIPTION
Basic skills in reading

COST

| | | |
|---|---|---|
| Reusable test booklets | (25) | $38.30 |
| Answer sheets (100) | | 20.95 |

ALTERNATE FORMS
No

COPYRIGHT DATE(S)
1958

SCORING
Self-interpreting profile, percentile scores by grade (6-12)

ADMINISTRATION
Group administration; general directions read aloud for each sub-test

MINUTES REQUIRED
10 tests (2-5 min each)
Total 31 minutes

REPORTING FORMAT
Not available in Examiner Manual

RELIABILITY
Not available in Examiner Manual

VALIDITY
Correlations with other reading and general ability tests are quite high (.63 - .84).

TITLE: The Steck-Vaughn Placement Survey for Adult Basic Education

## Reviewers' Test Item Analysis

READING SKILL(S) ITEMS APPEAR TO ASSESS

Some reading to find specific information, and reading to relate new material to prior knowledge; much reading in order to draw conclusions; a little critical reading; some referencing

ITEM ORIENTATION:

| | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | Some |
| Functional, Life Skills | Some |

| | |
|---|---|
| LEVEL(S) OF ITEM DIFFICULTY | Test has two levels<br>Very low - Moderately difficult |
| NUMBER OF ITEMS | 61 - Reading |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS

Steck-Vaughn Company
P.O. Box 2028
Austin, TX 78768

ADMINISTRATION

Individual or group administration

PUBLISHER DESCRIPTION

Achievement in vocabulary, reading language and math; two forms available for each level

MINUTES REQUIRED

Untimed

COST

| | |
|---|---|
| Reusable test booklets (25) | $66.00 |
| Answer sheets (50) | 6.00 |

REPORTING FORMAT

Raw score and grade equivalent (scores are prescriptive with regard to use of Steck-Vaughn individualized programs)

ALTERNATE FORMS

Forms K & L = grades 0-4
Forms M & Q = grades 4-8

COPYRIGHT DATE(S)

1981

RELIABILITY

No information in Examiner Manual

SCORING

Answer template

VALIDITY

No information in Examiner Manual

TITLE: Minimum Essentials Test

## Reviewers' Test Item Analysis

WRITING SKILL(S) ITEMS APPEAR TO ASSESS
Some punctuation and subjective measures of spelling, punctuation, and writing phrases and sentences neatly

| ITEM ORIENTATION: | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Functional, Life Skills | Yes |
| LEVEL(S) OF ITEM DIFFICULTY | Moderate |
| TOTAL NUMBER OF ITEMS | 50 + writing sample |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS
Scott Foresman and Company
1900 East Lake Avenue
Glenview, IL 60025

PUBLISHER DESCRIPTION
Test to measure minimum competency and basic skills in reading, math, writing, and life skills; grades 8-12 and Adult

COST

| | |
|---|---|
| Test booklets (35) | $24.85 |
| Answer sheets (35) | 7.95 |

ALTERNATE FORMS
Forms A, B, and C

COPYRIGHT DATE(S)
1981

SCORING
Machine, hand scoring with answer key

ADMINISTRATION
Individual or group administration; general directions to be read aloud for each of three subtests

MINUTES REQUIRED

| | |
|---|---|
| Basic Skills | 45 |
| Life Skills | 45 |
| Writing (optional) | 20 |

REPORTING FORMAT
Raw score, percent correct: National percentile ranks reported for hand scored method

RELIABILITY
Not available in Examiner Manual

VALIDITY
Not available in Examiner Manual

TITLE: Brigance Diagnostic Inventory of Essential Skills

## Reviewers' Test Item Analysis

WRITING SKILL(S) ITEMS APPEAR TO ASSESS

Some spelling, punctuation, writing, use of alphabetic ordering and an indirect measure of sentence writing skills

| | |
|---|---|
| ITEM ORIENTATION: | |
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Functional, Life Skills | Yes |
| LEVEL(S) OF ITEM DIFFICULTY | Very low - low |
| NUMBER OF ITEMS | 165 |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS

Curriculum Associates, Inc.
5 Esquire Road
North Billerica, MA 01863

PUBLISHER DESCRIPTION

Assessment of skills and minimal competencies necessary for successful life experience; criterion-referenced; 4th-11th grade

COST

Not available

ALTERNATE FORMS

Forms A and B

COPYRIGHT DATE(S)

1981

SCORING

Each assessment has scoring instructions to achieve a raw score.

ADMINISTRATION

Some assessments individual with oral responses, others are group with written responses

MINUTES REQUIRED

Some assessments areas are timed, others are not

REPORTING FORMAT

Raw score, objective for improvement, minimum competency level established by user

RELIABILITY

Not reported in Examiner Manual

VALIDITY

Not reported in Examiner Manual

TITLE: The Massachusetts Basic Skills Assessment of Listening and Speaking

## Reviewers' Test Item Analysis

SKILL(S) ITEMS APPEAR TO ASSESS
Identifying and understanding main idea, associating important details with the main idea, critical (understanding speaker's purpose), following directions, summarizing information and drawing conclusions.

ITEM ORIENTATION:

| | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Life Skills/Classroom Skills | Both |

| | |
|---|---|
| LEVEL(S) OF ITEM DIFFICULTY | Low to High (secondary level) |
| NUMBER OF ITEMS | 50 |

## General Information from Examination Copy

DEVELOPER NAME AND ADDRESS
Massachusetts Dept. of Education
Bureau of Research and Assessment
39 St. James Avenue
Boston, MA 02116

PUBLISHER/DEVELOPER DESCRIPTION
A general descriptive test of listening ability (placement not diagnostic)

COST
Not reported

ALTERNATE FORMS
A-1 Form 3

COPYRIGHT DATE(S)
1980

SCORING
Answer key

ADMINISTRATION
Group, multiple choice, written passages provided for making of a tape

MINUTES REQUIRED
Not reported

REPORTING FORMAT
Raw score, percentage score

RELIABILITY
Hoyt estimate of reliability (internal consistency) .76

VALIDITY
Content validity determined by a panel of "expert judges" in a blind review of the items

TITLE: The Massachusetts Basic Skills Assessment of Listening and Speaking

## Reviewers' Test Item Analysis

SPEAKING SKILL(S) ITEMS APPEAR TO ASSESS

Delivery or transmission of message (volume, rate, articulation); organization or structure (sequence and relationship); content (quantity, relevance and adaptation), and language (grammar and choice or words)

ITEM ORIENTATION:

| | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Life Skills/Classroom Skills | Both |

| | |
|---|---|
| LEVEL(S) OF ITEM DIFFICULTY | Low to High (secondary level) |
| NUMBER OF ITEMS | Not reported |

## General Information from Examination Copy

DEVELOPER NAME AND ADDRESS

Massachusetts Dept. of Education
Bureau of Research and Assessment
39 St. James Avenue
Boston, MA 02116

PUBLISHER/DEVELOPER DESCRIPTION

A general descriptive test of speaking ability (placement not diagnostic)

COST

None

ALTERNATE FORMS

A-1 Form 3

COPYRIGHT DATE(S)

1980

SCORING

Answer key

ADMINISTRATION

Group, multiple choice, written passages provided for making of a tape

MINUTES REQUIRED

Not reported

REPORTING FORMAT

Raw score, percentage score

RELIABILITY

Hoyt estimate of reliability (internal consistency) .76

VALIDITY

Content validity determined by a panel of "expert judges" in a blind review of the items

TITLE: Comprehensive Tests of Basic Skills

## Reviewers' Test Item Analysis

MATH SKILL(S) ITEMS APPEAR TO ASSESS

Some whole numbers, measurements, fractions, decimals; a lot of practical problems, weak on percentages, some algebra, ratio and geometry

ITEM ORIENTATION:

| | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Functional, Life Skills | Yes |

| | |
|---|---|
| LEVEL(S) OF ITEM DIFFICULTY | Low - High |
| NUMBER OF ITEMS | 98 - Math |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS

CTB/McGraw Hill
Del Monte Research Park
Monterey, CA 93940

PUBLISHER DESCRIPTION

Measures level of attainment in language, number and problem-solving skills for academic and everyday needs; seven levels range from K - 12.

ALTERNATE FORMS

Forms S and T

COST

| | |
|---|---|
| Test booklets (35) | 24.85 |
| Hand scoreable answer sheets (50) | 6.50 |
| Scoring stencil | 3.25 |

COPYRIGHT DATE(S)

1973

SCORING

Machine, hand scoring with stencils, self-scoring

ADMINISTRATION

Individual or group; general directions to be read aloud for each of eight sections

MINUTES REQUIRED

| | |
|---|---|
| Math Computation | 40 |
| Math Concepts | 35 |

REPORTING FORMAT

Grade equivalent, standard score, percentile, stanine; norms available

RELIABILITY

Not available in Examiner Manual

VALIDITY

Not available in Examiner Manual

TITLE: Stanford Diagnostic Math Test

## Reviewers' Test Item Analysis

MATH SKILL(S) ITEMS APPEAR TO ASSESS

Measures computation, concepts, and applications in whole numbers, fractions, decimals, practical (word) problems, percentages, ratio, algebra, a lot of graphs, some geometry

| ITEM ORIENTATION: | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Functional, Life Skills | Yes |
| LEVEL(S) OF ITEM DIFFICULTY | Low - High |
| NUMBER OF ITEMS | 120 - Math |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS
Harcourt Brace Janovich
Psychology Corporation
1001 Polk Street
San Francisco, CA 94109

PUBLISHER DESCRIPTION
Measures competence in basic concepts and skills in math; diagnostic; identifies strengths and weaknesses (number system and numeration, computation applications)

COST

| | |
|---|---|
| Test booklets (35) | 19.00 |
| Key | 1.75 |
| Answer documents | 4.75 |

ALTERNATE FORMS
Two

COPYRIGHT DATES
1976

SCORING
Machine, hand

ADMINISTRATION
Group or individual, general directions to be read aloud for each of three sub-tests

MINUTES REQUIRED

| | |
|---|---|
| Number system | 25 |
| Computation | 35 |
| Application | 30 |

REPORTING FORMAT
Raw score, percentile rank, stanine, grade equivalent, scaled scores

RELIABILITY
Kuder-Richardson 20 .88 - .97; standard error of measurement 2.3 - 4.5; alternate forms .81 - .95

VALIDITY
.69 - .94 correlation with Standford Achievement Test in Math

TITLE: California Achievement Test

## Reviewers' Test Item Analysis

MATH SKILL(S) ITEMS APPEAR TO ASSESS

Tests both computation and application: whole numbers, a little measurement, fractions, a lot of decimals, percentages, practical (word) problems, some algebra, geometry and graphs

| ITEM ORIENTATION: | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Functional, Life Skills | Yes |
| LEVEL(S) OF ITEM DIFFICULTY | Low - High |
| NUMBER OF ITEMS | 85 - Math |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS
CTB/McGraw Hill
Del Monte Research Park
Monterey, CA 93940

PUBLISHER DESCRIPTION
Norm-referenced and criterion-referenced

COST

| | |
|---|---|
| Reusable test booklets (35) | $36.05 |
| Self-scoring answer sheets (25) | 8.00 |

ALTERNATE FORMS
Forms C and D

COPYRIGHT DATE(S)
1977, 1978, revised from 1970 edition

SCORING
Machine, hand scoring with answer key, self-scoring

ADMINISTRATION
Individual or group; general directions read aloud for each subtest

MINUTES REQUIRED

| | |
|---|---|
| Math | 60 |

REPORTING FORMAT
Raw score, grade equivalent, scaled score, percentile rank, stanine

RELIABILITY
Not available in Examiner Manual

VALIDITY
Not available in Examiner Manual

## LIFE SKILLS ASSESSMENT ------ MATHEMATICS

TITLE: Minimum Essentials Test

### Reviewers' Test Item Analysis

MATH SKILL(S) ITEMS APPEAR TO ASSESS
Whole numbers, fractions, decimals, a few percentages, many practical (word) problems

| ITEM ORIENTATION: | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Functional, Life Skills | Yes |

| | |
|---|---|
| LEVEL(S) OF ITEM DIFFICULTY | Low - Moderate |
| NUMBER OF ITEMS | 64 - Math |

### General Information from Examination Copy

PUBLISHER NAME AND ADDRESS
Scott, Foresman & Company
1900 East Lake Ave.
Glenview, IL 60025

PUBLISHER DESCRIPTION
Test to measure minimum competency and basic skills in reading, mathematics, writing and life skills

| COST | | |
|---|---|---|
| Test booklets | (35) | $24.85 |
| Answer sheets | (35) | 7.95 |

ALTERNATE FORMS
Forms A, B, and C available

COPYRIGHT DATE(S)
1981

SCORING
Machine, hand scoring with answer key

ADMINISTRATION
Individual or group; general directions read aloud for each sub-test

| MINUTES REQUIRED | |
|---|---|
| Basic skills | 45 |
| Life skills | 45 |
| Writing (optional) | 20 |

REPORTING FORMAT
Raw score, percent correct; national percentile ranks reported for hand-scoring method

RELIABILITY
Not available in Examiner Manual

VALIDITY
Not available in Examiner Manual

TITLE: General Educational Performance Index

## Reviewers' Test Item Analysis

MATH SKILL(S) ITEMS APPEAR TO ASSESS

Whole numbers, measurement, fractions, decimals, some percentages, a lot of algebra, a little geometry and graphs; all twenty-three problems are practical (word) problems

| | |
|---|---|
| ITEM ORIENTATION: | |
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Functional, Life Skills | Yes |
| LEVEL(S) OF ITEM DIFFICULTY | High |
| NUMBER OF ITEMS | 23 - Math |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS

Steck-Vaughn Company
P.O. Box 2028
Austin, TX 78768

PUBLISHER DESCRIPTION

GED preparedness tests, indicates areas in need of attention prior to attempting GED. Writing, social studies, science, reading and math

COST

| | |
|---|---|
| Reusable tests (10) | $30.00 |
| Answer sheets (50) | 4.00 |

ALTERNATE FORMS

Forms AA and BB available

COPYRIGHT DATE(S)

1981

SCORING

Hand scoring using template

ADMINISTRATION

Individual or group; general introduction read aloud

MINUTES REQUIRED

Untimed

REPORTING FORMAT

Raw score converted to standard score which can be used to determine cut scores for each section

RELIABILITY

Alternate forms correlation coefficients = .67 - .82

VALIDITY

Content: based on material used in GED training programs

Predictive: correlation coefficients between GEPI and GED ranged between .61 and .73

TITLE: The Adult Performance Level Survey (APL)

## Reviewers' Test Item Analysis

MATH SKILL(S) ITEMS APPEAR TO ASSESS

All 13 items are word problems dealing with whole numbers, fractions, decimals and percentages

| ITEM ORIENTATION: | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Functional, Life Skills | Yes |
| LEVEL(S) OF ITEM DIFFICULTY | Low - Moderate |
| NUMBER OF ITEMS | 13 - Math |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS
The American College Testing Program
26 Garden Center, Suite 3 C
Broomfield, CO 80020

PUBLISHER DESCRIPTION
Achievement and functional competency of adults, identification or facts and terms, reading, writing, computation, problem-solving, community resources, occupational knowledge, consumer economics, health, government and law

COST
Not reported

ALTERNATE FORMS
No

COPYRIGHT DATE(S)
1976

SCORING
Not reported

ADMINISTRATION
Group or individual; general directions to be read aloud

MINUTES REQUIRED
Untimed

REPORTING FORMAT
Raw score, percentages

RELIABILITY
Kuder-Richardson - 20
.52 - .87;
Split-half .53 - .87

VALIDITY
Content validity based on University of Texas research

TITLE: Stanford Achievement Test

## Reviewers' Test Item Analysis

MATH SKILL(S) ITEMS APPEAR TO ASSESS

Measures computation, concepts and applications of whole numbers, fractions, decimals, percentages, algebra, graphs and geometry

| ITEM ORIENTATION: | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Functional, Life Skills | Yes |
| LEVEL(S) OF ITEM DIFFICULTY | Low - High |
| NUMBER OF ITEMS | 120 - Math |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS
Harcourt Brace Jovanovich
Psychology Corporation
1001 Polk Street
San Francisco, CA 94109

PUBLISHER DESCRIPTION
Achievement test, measurement and assessment of learning at different levels

| COST | |
|---|---|
| Test Booklets (35) | $27.25 |
| Key | 2.85 |
| Answer Documents (35) | 5.00 |

ALTERNATE FORMS
Forms A, B, C

COPYRIGHT DATE(S)
1972 Copyright (1923, 1929, 1940, 1953, 1964)

SCORING
Machine, or hand scoring with stencil key

ADMINISTRATION

| MINUTES REQUIRED | |
|---|---|
| Math Concepts | 20 |
| Math Computation | 35 |
| Math Application | 35 |

REPORTING FORMAT
Raw scores, percentile ranks, stanines, grade equivalents, scaled scores

RELIABILITY
Spearman Brown .85-.96
Kuder-Richardson 20 .85-.96
SEM 2.6 - 4.0

VALIDITY
Content validity

TITLE: Test of Performance in Computational Skills (TOPICS)

## Reviewers' Test Item Analysis

MATH SKILL(S) ITEMS APPEAR TO ASSESS
Whole numbers, measurement, a few fractions, a lot of decimals; all 72 items are practical (word) problems with consumer education emphasis

| ITEM ORIENTATION: | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Functional, Life Skills | Yes |
| LEVEL(S) OF ITEM DIFFICULTY | Low - Moderate |
| TOTAL NUMBER OF ITEMS | 72 |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS
CTB/McGraw Hill
Del Monte Research Park
Monterey, CA 93940

PUBLISHER DESCRIPTION
Proficiency in basic math skills needed in adult life; diagnostic and evaluative

COST

| | |
|---|---|
| Test booklets (35) | 24.50 |
| Answer sheets (50) | 5.50 |

ALTERNATE FORMS
Forms A, AE

COPYRIGHT DATE(S)
1978

SCORING
Machine, hand, self

ADMINISTRATION
Individual or group; general directions to be read aloud for each of two sections

MINUTES REQUIRED
About 50 minutes for each of two sections; allow enough time for every item to be attempted

REPORTING FORMAT
Class report, individual report, frequency distributions, cut score to be established by user

RELIABILITY
No information in Examiner Manual

VALIDITY
No information in Examiner Manual

TITLE: Assessment Skills in Computation

## Reviewers' Test Item Analysis

MATH SKILL(S) ITEMS APPEAR TO ASSESS

Whole numbers, measurement, fractions, decimals, a little percentage, plus geometry; all 72 items are practical (word) problems

| ITEM ORIENTATION: | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Functional, Life Skills | Yes |
| LEVEL(S) OF ITEM DIFFICULTY | Low - Moderate |
| TOTAL NUMBER OF ITEMS | 72 |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS
CTB/McGraw Hill
Del Monte Research Park
Monterey, CA 93940

PUBLISHER DESCRIPTION
Measures ability to handle computation problems typically encountered in everyday living, diagnostic, prescriptive; may be used in remedial program for adults

COST

| | |
|---|---|
| Reusable test booklets (35) | 22.40 |
| Answer sheets | 5.75 |

ALTERNATE FORMS
No

COPYRIGHT DATE(S)
Not reported

SCORING
Not reported

ADMINISTRATION
Individual or group administration; general directions to be read aloud for each of two sections

MINUTES REQUIRED
Untimed

REPORTING FORMAT
Cut score established by user

RELIABILITY
Not available in Examiner Manual

VALIDITY
Not available in Examiner Manual

TITLE: Test of Adult Basic Education (TABE)

## Reviewers' Test Item Analysis

MATH SKILL(S) ITEMS APPEAR TO ASSESS

Tests computation, concepts and applications of whole numbers, and fractions; covers computation and concepts of measurement and decimals; tests concepts and applications of percentages; and many practical (word) problems.

| | |
|---|---|
| ITEM ORIENTATION: | |
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Functional, Life Skills | Yes |
| LEVEL(S) OF ITEM DIFFICULTY | Low - Moderately High |
| NUMBER OF ITEMS | 108 - Math |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS
CTB/McGraw-Hill
Del Monte Research Park
Monterey, CA 93940

PUBLISHER DESCRIPTION
3 levels - Easy, Medium, Difficult
Achievement in reading, math, language
-adopted from 1970 edition of California Achievement Test

COST

| | |
|---|---|
| Test booklets (25) | $21.25 |
| Answer sheets (50) | 10.50 |

ALTERNATE FORMS
Two parallel forms for each level

COPYRIGHT DATE(S)
1976 edition, revised from earlier edition

SCORING
Hand scoring with answer key, overlay available

ADMINISTRATION
Individual or group; general directions read aloud for each section

MINUTES REQUIRED
Math 65

REPORTING FORMAT
Group record sheet, Student Profile sheet, analysis of learning difficulties, raw score, scaled score, and grade equivalent for each area (3) and each sub area (6)

RELIABILITY
No information in Examiner Manual (technical manual in preparation)

VALIDITY
No information in Examiner Manual

TITLE: SRA Achievement Series

## Reviewers' Test Item Analysis

MATH SKILL(S) ITEMS APPEAR TO ASSESS

Whole numbers, a little measurement, fractions, decimals, percentages, algebra, geometry and graphs; emphasis on practical (word) problems

| ITEM ORIENTATION: | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Functional, Life Skills | Yes |
| LEVEL(S) OF ITEM DIFFICULTY | Low - High |
| NUMBER OF ITEMS | 100 - Math |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS
Science Research Associates
155 N. Walker Drive
Chicago, IL 60606

PUBLISHER DESCRIPTION
Achievement in reading, math, language arts, reference materials, social studies and science

| COST | |
|---|---|
| Test booklets (25) | $28.00 |
| Answer sheets (100) | 20.95 |

ALTERNATE FORMS
Forms 1 and 2

COPYRIGHT DATE(S)
1978

SCORING
Machine or hand scoring

ADMINISTRATION
Individual or group, general directions read aloud for each sub-test

| MINUTES REQUIRED | |
|---|---|
| Math | 90 |

REPORTING FORMAT
Not available in Examiner Manual

RELIABILITY
Not available in Examiner Manual

VALIDITY
Not available in Examiner Manual

TITLE: Steck-Vaughn Placement Survey for Adults Basic Education

## Reviewers' Test Item Analysis

MATH SKILL(S)/CONCEPTS ITEMS APPEAR TO ASSESS:

Whole numbers, fractions, decimals, percentages; most emphasis on practical (word) problems; a little geometry.

ITEM ORIENTATION:

| | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Functional, Life Skills | Yes |

| | |
|---|---|
| LEVEL(S) OF ITEM DIFFICULTY | Moderate |
| NUMBER OF ITEMS | 54 - Math |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS

Steck-Vaughn Company
P.O. Box 2028
Austin, TX 78768

PUBLISHER DESCRIPTION

Achievement in vocabulary, reading, language and math. Two forms available for each level.

COST

| | |
|---|---|
| Reusable test booklets (25) | $66.00 |
| Answer sheets (50) | 6.00 |

ALTERNATE FORMS

Forms K & L = grades 0-4
Forms M & Q = grades 4-8

COPYRIGHT DATE(S)

1981

SCORING

Answer template

ADMINISTRATION

MINUTES REQUIRED

Untimed

REPORTING FORMAT

Raw score and grade equivalent (scores are presecriptive with regard to use of Steck-Vaughn individualized programs)

RELIABILITY

No information in Examiner Manual

VALIDITY

No information in Examiner Manual

TITLE: Adult Basic Learning Examination (ABLE)

## Reviewers' Test Item Analysis

MATH SKILL(S) ITEMS APPEAR TO ASSESS

Whole numbers, a little measurement, fractions, decimals, percentages and many practical (word) problems, algebra and graphs

| | |
|---|---|
| ITEM ORIENTATION: | |
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Functional, Life Skills | Yes |
| LEVEL(S) OF ITEM DIFFICULTY | Low - Moderate |
| NUMBER OF ITEMS | 50 - Math |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS

Harcourt Brace Janovich, Inc.
Psychology Corporation
1001 Polk Street
San Francisco, CA 94109

PUBLISHER DESCRIPTION

Measure of educational achievement among adults: vocabulary, reading, spelling, arithmetic computation and problem-solving, arithmetic total

COST

Test Booklets (35) 34.50
(Three separate booklets required)

ALTERNATE FORMS

Forms A and B

COPYRIGHT DATE(S)

1967

SCORING

Machine, or hand scoring with answer key

ADMINISTRATION

Group or individual; vocabulary and spelling are dictated; general directions to be read aloud for each sub-test

MINUTES REQUIRED

Untimed

REPORTING FORMAT

Raw score, grade score

RELIABILITY

Split Half .60 - .96

VALIDITY

Not reported in Examiner Manual

# CLASSROOM SKILLS ASSESSMENTS

TITLE: Brown-Carlsen Listening Comprehension Test

## Peviewers' Test Item Analysis

SKILL(S) ITEMS APPEAR TO ASSESS

Some listening carefully to ensure understanding of main intent or thrust of what speaker is saying; to identify whether what is said is based on opinion or fact.

| ITEM ORIENTATION: | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | A little |
| Life Skills/Classroom Skills | Classroom |

LEVEL(S) OF ITEM DIFFICULTY Moderate - High

NUMBER OF ITEMS 76

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS

Communications Development Inc.
25 Robb Farm Road
St. Paul, Minnesota 51510

PUBLISHER DESCRIPTION

Test of ability to comprehend spoken language

| COST | |
|---|---|
| Manual | $ 8.00 |
| Answer sheet (35) | 10.00 |
| Answer key | 5.00 |

ALTERNATE FORMS

Forms AM and BM

COPYRIGHT DATE(S)

Not reported

SCORING

Machine, or hand scoring with stencil

ADMINISTRATION

Group or individual; oral administration
General directions to be read aloud for each sub-test

MINUTES REQUIRED

Untimed

REPORTING FORMAT

Raw score, standard score, percentile rank

RELIABILITY

Split Half .84 - .90
Alternate Forms .84 - .90

VALIDITY

Correlations with reading, I.Q. tests, and language tests

TITLE: St. Edwards Video Test (Pre and Post)

## Reviewers' Test Item Analysis

LISTENING SKILL(S) ITEMS APPEAR TO ASSESS
Literal listening (to get information and remember details)

| ITEM ORIENTATION: | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Life Skills/Classroom Skills | Classroom skills |
| LEVEL(S) OF ITEM DIFFICULTY | Moderate |
| NUMBER OF ITEMS | 16 |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS
HBJ Media Systems Corporation
A subsidiary of Harcourt Brace Janovich
757 Third Avenue
New York, NY 10017

PUBLISHER DESCRIPTION
Note taking ability, ability to follow directions, short and intermediate term memory, and the ability to focus attention on a complex aural message (pre-test for listening course at St. Edward's University)

COST
Audio and video tape versions $75.00

COPYRIGHT DATE(S)
1982

SCORING
Cut-off set at 88% correct of Part 1 (Listening to get information) and 67% correct of Part 2 (Remembering Details)

ADMINISTRATION
1/2" color video, or an audio tape; student requires a pencil, answer sheet, and note-taking sheet

MINUTES REQUIRED
40

REPORTING FORMAT
Norms on high schoool and college students available

ALTERNATE FORMS
Pre and post

RELIABILITY
Information not available in Examiner Manual

VALIDITY
Information not available in Examiner Manual

## CLASSROOM SKILLS ASSESSMENT ------ LISTENING

TITLE: Dow Listening Test

### Reviewers' Test Item Analysis

SKILL(S) ITEMS APPEAR TO ASSESS
Listening comprehension; receipt, storing and analyzing information.

| ITEM ORIENTATION: | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Life Skills/Classroom Skills | Classroom skills |
| LEVEL(S) OF ITEM DIFFICULTY | High (high school seniors and college freshmen) |
| NUMBER OF ITEMS | 32 |

### General Information from Examination Copy

PUBLISHER NAME AND ADDRESS
Listening Lab
St. Edward's University
Austin, TX

PUBLISHER/DEVELOPER DESCRIPTION
Testing listening comprehension of high school seniors and college freshmen; tests the receipt, storing and analyzing aural information

COST
Not reported

ALTERNATE FORMS
No

COPYRIGHT DATE(S)
1950's - revised

SCORING
Self-scored

ADMINISTRATION
Group or individual;
audio tape oral instructions

MINUTES REQUIRED
Timed - but number of minutes not specified in review materials

REPORTING FORMAT
Not reported

RELIABILITY
Not available in Examiner Manual

VALIDITY
Not available in Examiner Manual

VALIDITY
Not available in Examiner Manual

TITLE: Michigan Educational Assessment Program (MEAP)

## Reviewers' Test Item Analysis

SKILL(S) ITEMS APPEAR TO ASSESS
Listening to the main intent, listening for details

| ITEM ORIENTATION: | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | No |
| Life Skills/Classroom Skills | Classroom |
| LEVEL(S) OF ITEM DIFFICULTY | Moderate (10th grade) |
| NUMBER OF ITEMS | 13 listening passages (24 items) |

## General Information from Examination Copy

DEVELOPER NAME AND ADDRESS
Michigan Dept. of Education
Michigan Educational Assessment Program
Box 30008
Lansing, MI 48909

PUBLISHER/DEVELOPER DESCRIPTION
Not reported

COST
No cost

ALTERNATE FORMS
For Grades 4 and 7

COPYRIGHT DATE(S)
1979-80

SCORING
Cut score - 2 out of 3 items correct per objective (8), Scoring keys

ADMINISTRATION
Audio tapes

MINUTES REQUIRED
Untimed

REPORTING FORMAT
Raw score

RELIABILITY
Kuder Richardson 20 used, but no specifics cited in manual

VALIDITY
Technical Manual available

TITLE: Communication Competency Assessment Instrument (CCAI)

## Reviewers' Test Item Analysis

SKILL(S) ITEMS APPEAR TO ASSESS
Communication codes, oral message evaluation, basic speech communication skills, human relations

ITEM ORIENTATION:

| | |
|---|---|
| Auto Mechanics/Auto Body | No |
| Vocational General | (The 19 competencies could be applied to an occupational context according to the Speech Communication Association's 1978 Task Force.) |
| Life Skills/Classroom Skills | Classroom |
| LEVEL(S) OF ITEM DIFFICULTY | Low to High |
| NUMBER OF ITEMS | 57 (long form)<br>19 (short form) |

## General Information from Examination Copy

PUBLISHER NAME AND ADDRESS
Speech Communication Association
5105 Backlick Rd.
Suite E
Anmandale, VA 22023

PUBLISHER/DEVELOPER DESCRIPTION
Directly assesses college level speaking and listening skills

COST
Not reported

ALTERNATE FORMS
Short and long

COPYRIGHT DATE(s)
1980

SCORING
Performance rating scale

ADMINISTRATION
Videotape

MINUTES REQUIRED
Not reported

REPORTING FORMAT
Not reported

RELIABILITY
Reliability testing being carried out at University of Wisconsin - Parkside. Initial coefficient alphas, inter-rater reliability coefficients support validity of instruments.

VALIDITY
Content validity established by subject matter experts.

## Section VI

# Final Conclusions and Recommendations

# Final Conclusions and Recommendations

## 1. Basic Skills Data Analysis

## CONCLUSIONS

### Reading

Industry participants reported that 20% of the basic skills in the AM and AB occupations require reading. Entry-level AM's and ABW's read:

- catalogs, manuals, inspection books
- gauges, hydrometers, micrometers
- work orders and estimates (including abbreviations)
- directions on product labels

Over half of the reading done by AM's and ABW's is literal reading.

### Writing

Industry participants in this study also reported that only 13% of all basic skills used involves some type of writing. It is the basic skill used least by AM's and ABW's. They indicated that writing consists of:

- abbreviations on forms (work orders, accident reports, road test forms, etc.)
- numbers (of parts, warpage, tire tread measures, specifications)

Seventy-one percent of all writing involves writing mechanics (using correct alphabetical order, correct spelling, penmanship and punctuation).

### Listening

Of the educational skills used on the job by AM's and ABW's, 20% involves listening. Listening in these occupations consists of three types:

- listening to one person, face-to-face (boss, other workers, and occasionally customers, although most entry-level automotive workers do not have much direct contact with customers)
- listening to equipment sounds (e.g., whistle of fan belt, noise during a compression test, air leaks)
- comprehending non-verbal communications (e.g., a thumb in the air can mean go ahead and remove or replace)

Fifty-nine percent of the listening required of an AM or ABW is literal listening, or listening to facts.

## Speaking

According to industry participants, 22% of the basic educational skills used in the AM and ABW occupations involve some type of speaking, usually to supervisors or other workers. Most speaking done by entry-level workers is to:

- request parts of tools
- describe work done
- describe problems encountered
- ask for help

Forty-seven percent of the speaking done by AM's and ABW's is pronouncing and using language properly, or in other words, the mechanics of speaking.

It should be noted, however, that the group of experts in the tire specialty area indicated that an entry-level worker is encouraged to speak to customers when he/she discovers something other than the tires that needs replacing, (e.g., convincing a customer that something such as shocks are also needed). The experts in other areas indicated that entry-level workers are not encouraged to speak to customers, since managers and foremen usually handle customer relations. Counselors might keep in mind that a person with limited English proficiency would encounter difficulty in the tire area.

## Mathematics

Industry participants reported that 25% of the basic educational skills used on the job by AM's and ABW's involve some type of mathematics. In fact, it is the basic skill most used in these occupations.

Participants reported that mathematics in these occupations consists mainly of:

- measuring (length, width, thickness, weight, volume, voltage, pressure), stated mostly in whole numbers and fractions

Thirty-one percent of all math used by an AM or ABW is using whole numbers.

## RECOMMENDATIONS

In all areas, the communications skills requiring the least amount of involvement on the part of the listener, speaker, reader or writer (i.e., mechanics) are those skills most used on the job.

The implication for instructors is to stress the mechanics of writing, reading to find specific information, listening to facts, and pronunciation and vocabulary usage in speaking.

In mathematics, work with whole numbers warrants the most attention along with measurement.

Of the basic skills, math is the most essential, writing the least essential for an AM or ABW - a significant fact for assessment counselors and curricula developers.

## 2. Automotive Occupations and Specialty Areas

### CONCLUSIONS

The specialty areas of Front End, Engine Rebuild, and Tune-Up require the greatest use of communication and mathematics skills. The areas of Brakes, Tires, and the occupation of Auto Body require the least communication and mathematics skills.

### RECOMMENDATIONS

The implication for counselors is that students considering a specialization in Front End, Engine Rebuild, or Tune-Up should be made aware of the high percentage of basic skills required, and should be encouraged to consider another specialty area if they have difficulty with basic educational skills, or be encouraged to increase their proficiency in these skills before entering vocational training. Students with limited mastery of these skills will perhaps have more success in the areas of Brakes, Tires, or the occupation of Auto Body.

## 3. Instructional Resources

### CONCLUSIONS

Authors seem to have given more detailed attention to vocationally specific mathematics than to the other basic skills. In fact, there are some materials that link mathematics to specific tasks. Since math is the most essential educational skill for an AM or ABW, the abundance of instructional materials is indeed fortunate.

Reading materials are also relatively numerous for AM's and ABW's, and there are many at low reading levels., Some vocabulary materials exist, usually in the form of lists to be memorized.

No speaking or listening instructional materials were found that were specific to AM's or ABW's. Very few listening or speaking materials of any kind are available, other than texts that focus on public speaking, or listening in a college classroom.

No vocationally specific writing materials were located, and only two vocationally general texts were found. Most writing texts are intended to teach composition, (an unnecessary skill for AM's and ABW's).

## RECOMMENDATIONS

Listening and Speaking materials: It is a myth that speaking and listening skills are automatically acquired and therefore training is unnecessary. They are essential skills for AM's and ABW's, and since no vocationally specific materials exist at present, the responsibility for instructors is to adapt other materials or to create their own. There is a real need for development of specific speaking and listening materials.

Writing materials: Although no vocationally specific writing materials appear to exist either, curricula developers, assessment counselors, and basic skills instructors should be aware of the relative unimportance of writing skills (other than legibility and abbreviations) for AM's and ABW's.

Reading materials: The texts that are intended to teach reading in the context of auto mechanics or auto body work are usually low-level reading, but the level of the reading that an AM or ABW has to do on the job is quite high (see actual reading and writing samples, Appendix C). The implication for basic skills instructors is to attempt to bring the reading level of students up as much as possible to be in line with realistic requirements of these occupations.

One reason for the high reading level (in manuals, on product label instructions, etc.) is the use of technical vocabulary. While a student may know the words as spoken, he/she may not recognize them in print. The vocabulary materials that exist are lacking in that they are neither contextualized nor applied in any functional way by the student. Once more, the instructor is left with the responsibility of adapting existing materials or creating new ones.

## 4. Assessment Resources

### CONCLUSIONS

Approximately fifty assessments were reviewed by the subject matter experts. Thirty of those assessments met minimal review criteria. Their item orientation or context are as follows: two of the thirty are Vocationally Specific, five are Vocationally General, eighteen are Life Skills, and five are Classroom Skills.

The two Vocationally Specific resources were: the "Diagnostic Reading Survey" at the end of the text, Mathematics for Auto Mechanics (see Instructional Review Section) and the Washington State "Automotive Mechanics Skills Check". Due to the focus of this report, they will be discussed in some detail. Then we will discuss the degree to which each basic skill for AM's and ABW's is evaluated.

The "Diagnostic Reading Survey" is a vocationally specific instrument. As the name indicates, it is a diagnostic rather than a placement tool -- perhaps useful as a pre- and post-assessment within the automotive training area rather than as a pre-screening device. It includes vocabulary, spelling, charts, tables, indices, diagrams, finding facts and information, following directions, and finding the main idea. The reading level, however, was judged by the reviewers to be well below the level of standard reference materials in auto mechanics and auto body. No reliability or validity measures are cited; however, face validity is quite high.

The "Automotive Mechanics Skills Check" is also a diagnostic rather than a placement tool. Level of item difficulty was judged to be high. It appears to assess vocabulary and reading for the main idea as well as mathematics.

Sixteen of the assessments tested READING. All sixteen covered some literal and interpretive reading skills; seven of the sixteen dealt with critical reading. Since critical skills are less important to AM's and ABW's, this is not particularly problematic. The subject matter experts judged the "Basic Skills Assessment" (Addison Wesley) to be the best ready made test available for AM and AB reading and writing skills.

Only five of the assessments dealt with WRITING skills. Four of those five covered mechanics, all five dealt with phrase and sentence writing and none with composing paragraphs, etc. Of the tests reviewed, only the "Basic Skills Assessment" requires an actual writing sample. However, no scoring criteria are supplied for the sample. Actual writing skills are generally inferred from the objective-type questions on all the other writing assessments.

Five assessments of LISTENING were reviewed. Three of the five tested literal listening skills, two tested interpretive, and two critical. Again, that matches the report findings: literal skills are the most important to AM's and ABW's and critical skills the least important.

There were only two SPEAKING assessments found. These dealt mainly with pronounciation, vocabulary, asking questions and supplying facts. No real assessment of explaining or describing was found. The listening and speaking assessments fell into the Life Skills and Classroom Skills contexts, and therefore are the farthest from being Vocationally Specific or Vocationally General in focus. The assessment of LISTENING AND SPEAKING present the most challenge. Reliability, validity and test bias are the hardest to deal with in these skill areas. Since videotaping and observer ratings are employed, oral communication is a comparatively expensive area to assess.

Half of the thirty assessments tested MATHEMATICS skills. Most of the fifteen fell into the Life Skills category. All fifteen tested whole numbers and fractions. Fourteen dealt with decimals and practical word problems. Twelve covered percentages and eleven tested measurement skills. The math subject matter expert judged the "Blue Level Stanford Achievement Test" and the "Comprehensive Test of Basic Skills" to be the most suited to the assessment of AM and AB mathematics.

## RECOMMENDATIONS

Each institution should choose its basic skills assessment or assessments based on such considerations as population served, cost of test, scoring, alternate forms, administration, reliability, validity, and level of item difficulty, etc.

Since no one assessment seems to meet all of the basic skills testing needs for AM's and ABW's, it may be necessary to select several assessments or sections of assessments in order to cover all the related basic skills in a placement test. A careful analysis of the correct level of difficulty would need to be done as well. Then, test items might have to be created and validated to fill in the remaining gaps.

Developing assessments 'from scratch' which are criterion-referenced to an institution's AM and AB basic skills curricula is also a possibility, although a rather expensive and long-term one if test item validation is done.

Creation of institutional or local norms on the test(s) selected or created is another option. This would validate them in a predictive sense. In vocational assessment centers, these data could be collected and the cut off scores for entry and exit could then be set with considerable accuracy. If test-taking were computerized, it would speed up this process a great deal.

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and
Appendices

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## Appendix A

# Commercial Publishers and Research Institutes Addresses

# APPENDIX A-1

## COMMERCIAL PUBLISHERS

ALLYN & BACON
7 Wells Avenue
Newton, MA 04159
Phone: 617-964-5530
Toll Free in Utah: 1-800-526-4799

BARNELL LOFT, LTD.
958 Church Street
Baldwin, NY 11510
Phone: 516-868-6064

CAMBRIDGE
The Adult Education Company
888 Seventh Avenue
New York, NY 10106
Phone: 212-957-5300

CONTEMPORARY BOOKS, INC.
180 North Michigan Avenue
Chicago, IL 60601
Phone: 312-782-9181

CURRICULUM ASSOCIATES, INC.
5 Esquire Road
North Billerica, MA 01862
Phone: 800-225-0248

DELMAR PUBLISHING CO.
50 Wolf Road
Albany, NY 12205
Phone: 408-867-3191
Toll Free in Utah: 1-800-883-3350

EDL/MCGRAW-HILL
1221 Avenue of the Americas
New York, NY 10020
Phone: 212-997-1221

EDUCATIONAL ACTIVITIES, INC.
P.O. Box 392
Freeport, NY 11520
Phone: 800-645-3739

EDUCATIONAL DESIGN, INC.
47 West 13 Street
New York, NY 10011
Phone: 800-221-9372

EDUCATORS PUBLISHING SERVICE
75 Moulton Street, Dept. L
Cambridge, MA 02288

GLOBE BOOK COMPANY
50 West 23rd Street
New York, NY 10010
Phone: 212-741-0505

HAYDEN BOOK COMPANY
50 Essex Street
Rochelle Park, NJ 07662
Phone: 201-368-2202

LAKESHORE CURRICULUM MATERIALS CO.
2695 E. Dominguez Street
P.O. Box 6261
Carson, CA 90749
Phone: 800-421-5354

LEARNCO, INCORPORATED
128 High Street
Greenland, NH 03840
Phone: 603-778-0813

MCDOUGAL, LITTEL & CO.
P.O. Box 1667-LS
Evanston, IL 60204
Phone: 800-323-4345

PETERSON HANDWRITING COMPANY
2215 Commerce Street
Dallas, TX 75201
Phone: 214-651-0161

PRENTICE HALL MEDIA, INC.
150 White Plains Rd.
Tarrytown, NY 10591
Phone: 914-631-8300
Toll Free in Utah: 800-431-2266

SOUTH-WESTERN PUBLISHING CO.
855 California Avenue
Palo Alto, CA 94304
Phone: 415-857-0556
Toll Free in Utah: 1-800-227-8429

TEACHING AIDS, INC.
P.O. Box 1798
Costa Mesa, CA 92626
Phone: 714-548-9321

ZANER-BLOSER
2500 West Fifth Avenue
Columbus, OH 43216
Phone: 614-486-0221

## APPENDIX A-2

## CURRICULUM DEVELOPMENT & RESEARCH CENTERS

AMERICAN ASSOCIATION FOR VOCATIONAL INSTRUCTIONAL MATERIALS (AAVIM)
Engineering Center, University of Georgia
Athens, GA 30602
Phone: 404-542-2586

APPALACHIA EDUCATIONAL LABORATORY, INC. (AEL)
P.O. Box 1348
Charleston, WV 25325
Phone: 304-344-8371

CEMREL, INC.
2130 59th Street
St. Louis, MO 63139
Phone: 314-781-2900 or 314-781-1975 (nightline)

CENTER FOR EDUCATIONAL POLICY AND MANAGEMENT (CEPM)
College of Education, University of Oregon
Eugene, OR 97401
Phone: 503-686-5173

CENTER FOR SOCIAL ORGANIZATION OF SCHOOLS (CSOS)
The Johns Hopkins University
3505 North Charles Street
Baltimore, MD 21218
Phone: 301-338-7625

CENTER FOR THE STUDY OF EVALUATION (CSE)
UCLA Graduate School of Education
405 Hilgard Avenue
Los Angeles, CA 90024
Phone: 213-825-4711

CURRICULUM AND INSTRUCTIONAL MATERIALS CENTER
1500 West Seventh Avenue
Stillwater, OK 74074
Phone: 405-377-2000

CURRICULUM PUBLICATIONS CLEARINGHOUSE
Western Illinois University
76B Horrabin Hall
Macomb, IL 61455
Phone: 309-298-1917

EASTERN CURRICULUM COORDINATION CENTER
East Central Network/Illinois Vocational Curriculum Center
Sangamon State University, Building E-22
Springfield, IL 62708
Phone: 217-786-6375

FAR WEST LABORATORY FOR EDUCATIONAL RESEARCH AND DEVELOPMENT (FWL)
1855 Folsom Street
San Francisco, CA 94103
Phone: 415-565-3000

INSTITUTE FOR RESEARCH ON EDUCATIONAL FINANCE AND GOVERNANCE (IFG)
Stanford University
Stanford, CA 94305
Phone: 415-497-0791

INSTRUCTIONAL MATERIALS LABORATORY
The Ohio State University
1885 Neil Avenue, Room 112
Columbus, OH 43210
Phone: 614-422--5001

LEARNING RESEARCH AND DEVELOPMENT CENTER (LRDC)
University of Pittsburgh
3939 O'Hara Street
Pittsburgh, PA 15260
Phone: 412-624-4831

MID-AMERICA VOCATIONAL CURRICULUM CONSORTIUM (MAVCC)
1500 West Seventh Avenue
Stillwater, OK 74074
Phone: 1-800-654-3988

MID-CONTINENT REGIONAL EDUCATIONAL LABORATORY (McREL)
7302 Pennsylvania Avenue
Kansas City, MO 64114
Phone: 816-361-7700

MIDWEST CURRICULUM COORDINATION CENTER
State Department of Vocational and Technical Education
1500 West Seventh Avenue
Stillwater, OK 74074
Phone: 405-377-2000

NATIONAL CENTER FOR HIGHER EDUCATION MANAGEMENT SYSTEMS (NCHEMS)
P.O. Drawer P
Boulder, CO 80302
Phone: 303-447-1980

NATIONAL CENTER FOR RESEARCH IN VOCATIONAL EDUCATION (NCRVE)
Ohio State University
1960 Kenny Road
Columbus, OH 43210
Phone: 614-486-3655

NORTHWEST REGION EDUCATIONAL LABORATORY (NWREL)
710 S.W. Second Avenue
Portland, OR 97204
Phone: 503-248-6802

NORTHWESTERN CURRICULUM COORDINATION CENTER
Commission for Vocational Education
Airdustrial.Park, Building 17
Olympia, WA 98504
Phone: 206-753-0879

RESEARCH AND DEVELOPMENT CENTER FOR TEACHER EDUCATION (RDCTE)
University of Texas at Austin
Education Annex 3.203
Austin, TX 78712
Phone: 512--471-1343

RESEARCH FOR BETTER SCHOOLS, INC. (RBS)
444 Third Street
Philadelphia, PA 19123
Phone: 215-574-9300

SOUTHEAST CURRICULUM COORDINATION CENTER
Mississippi State University
Research and Curriculum Unit, Drawer DX
Mississippi, MS 39762
Phone: 601-325-2510

SOUTHWEST EDUCATIONAL DEVELOPMENT LABORATORY (SWDL)
211 East 7th Street
Austin, TX 78701
Phone: 512-476-6861

SOUTHWEST REGIONAL LABORATORY (SWRL)
4665 Lampson Avenue
Los Alamitos, CA 90720
Phone: 213-598-7661

VOCATIONAL RESOURCE CENTER
200 Old Matawan Road
Old Bridge, NJ 08857
Phone: 201-390-1191

VOCATIONAL-TECHNICAL EDUCATION CONSORTIUM OF STATES (V-TECS)
Southern Association of Colleges and Schools
795 Peachtree Street, N.E.
Atlanta, GA 30365
Phone: 404-875-8011

VOICE
721 Capitol Mall
Sacramento, CA 95814
Phone: 916-445-0401

WEST VIRGINIA VOCATIONAL CURRICULUM LABORATORY
Cedar Lakes Conference
Ripley, WV
Phone: 304-348-3688

WESTERN CURRICULUM COORDINATION CENTER
University of Hawaii
2444 Dole Street
Honolulu, HI 96822
Phone: 808-948-7834

WISCONSIN RESEARCH AND DEVELOPMENT CENTER FOR INDIVIDUALIZED SCHOOLING
1024 West Johnson Street
Madison, WI 53706
Phone: 608-263-4200

## Appendix B

# Original Auto Mechanics and Auto Body Task Lists

## Auto Mechanics
## BRAKES

DUTY: SERVICE AND REPAIR BRAKING SYSTEMS

Tasks:

1. Inspect for fluid problems
2. Inspect master cylinder
3. Hoist and inspect wheel brakes (drum type)
4. Inspect parking/emergency brake
5. Inspect power boost system
6. Inspect pedal linkage (drum type)
7. Inspect adjacent systems and components
8. Make diagnosis report
9. Test power unit and vacuum supply
10. Remove brake shoes (drum type)
11. Clean and service braking plate
12. Overhaul or replace wheel cylinders
13. Install brake shoes
14. Overhaul or replace brake drums and hubs
15. Overhaul or replace master cylinders
16. Bleed all systems
17. Adjust brakes
18. Adjust emergency brakes
19. Perform final inspection and complete paper work
20. Replace lower brake unit
21. Bleed systems (power brakes)
22. Service and repair disc brake system

Source:

Occupational Analysis, Colorado State University, Fort Collins, CO
Task/Activity Analysis, Ohio State University, Columbus, OH

## Auto Mechanics
## ENGINE REBUILD

### DUTY: PERFORM ENGINE OVERHAUL ACTIVITIES

Tasks:

1. Adjust valves
2. Clean and check for condition of engine
3. Diagnose valve train and cylinder head malfunctions
4. Disassemble engines
5. Grind and replace valves, reface valve seats, machine valve guides for special seals and inspect heads for warp
6. Inspect crankshaft and main and rod bearing journals, inspect and correct bearing fits, and replace crankshaft and bearings
7. Inspect exhaust system and inspect or replace exhaust manifold, muffler, and exhaust pipe assemblies
8. Perform cylinder balance tests
9. Perform cylinder leakage tests
10. Perform operational inspections of engine lubrication systems
11. Perform operational inspections of positive crankcase ventilation systems and repair or service crankcase ventilation systems
12. Remove engine from vehicles
13. Replace camshaft bearings, camshaft, valve lifters, gaskets, seals, timing chains and belts and timing gears and sprockets
14. Replace connecting rods and bearings, pistons and rings on piston
15. Replace engine mounts
16. Replace flywheels and flywheel ring gears
17. Replace oil pump
18. Run compression tests

### DUTY: MAINTAIN AND REPAIR COOLING SYSTEMS

Tasks:

1. Check coolant freezing points and coolant temperatures
2. Check overflow tanks and accessories
3. Chemically clean and flush cooling systems
4. Diagnose cooling systems troubles
5. Inspect, adjust and replace fan belts
6. Inspect water hoses
7. Pressure test cooling systems
8. Replace freeze plugs
9. Replace heater hoses
10. Replace radiator hoses
11. Replace radiator
12. Replace variable speed fans
13. Replace water pumps
14. Test and replace thermostats

Source:

Occupational Analysis, Colorado State University, Fort Collins, CO
Task/Activity Analysis, Ohio State University, Columbus, OH

# Auto Mechanics
## EXHAUST

### DUTY: REPLACE AND REPAIR EXHAUST SYSTEM COMPONENTS

Tasks:

1. Check, remove, replace exhaust manifold, if ncessary
2. Check, remove, replace exhaust pipe
3. Check, remove, replace heat riser
4. Check, remove, replace mufflers and resonators
5. Check, remove, replace tail pipe
6. Check, remove, replace muffler hangers

### DUTY: USE TOOLS, EQUIPMENT AND REFERENCES

Tasks:

1. Use booster cables to start vehicles
2. Use chain hoists
3. Use fasteners
4. Use hand tools
5. Use hydraulic presses
6. Use hand and air operated jacks and jack stands
7. Use lifts
8. Use manufacturers' service manuals or other references to determine procedures for performing adjustments, repairs, or replacement operations
9. Use parts manuals
10. Use power tools
11. Use transmission lifts

### DUTY: KEEPING RECORDS

Tasks:

1. Plan, schedule, and control maintenance of vehicle
2. Maintain inventory
3. Complete work order
4. Maintain warranty records and preventive maintenance sheets
5. Initiate and complete parts order

### DUTY: PERFORM OTHER ACTIVITIES

Tasks:

1. Participate in personnel meetings
2. Plan and lay out jobs
3. Prepare vehicle for work to be performed
4. Service accessory units
5. Observe shop safety standards

Source:

Occupational Analysis, Colorado State University, Fort Collins, CO
Task/Activity Analysis, Ohio State University, Columbus, OH

Auto Mechanics
FRONT END

## DUTY: SERVICE AND REPAIR STEERING SYSTEMS

Tasks:

1. Repair power steering gearbox
2. Repair power steering pump
3. Test power steering pump pressure
4. Repair steering gearbox (manual)
5. Inspect steering
6. Replace steering linkage
7. Replace sector shaft seal (power steering)
8. Adjust worm and sector in steering box (manual)

## DUTY: ALIGN AND REPLACE SUSPENSION SYSTEM

Tasks:

1. Replace steering spindle
2. Replace shock absorber
3. Replace front suspension control arm bushings
4. Replace load carrying ball joint
5. Replace torsion bar
6. Inspect and align rear end
7. Inspect and align front end

Source:
Occupational Analysis, Colorado State University, Fort Collins, CO
Task/Activity Analysis, Ohio State University, Columbus, OH

## Auto Mechanics
## TIRES

### DUTY: LUBRICATE AND PERFORM PREVENTIVE MAINTENANCE

Tasks:

1. Raise and lower vehicle with lift
2. Perform underside inspections
3. Lubricate differential
4. Lubricate chassis
5. Change crankcase oil
6. Change oil filter
7. Change or clean fuel filter
8. Perform under-hood inspections
9. Lubricate hardware
10. Complete final operations
11. Inspect tires on vehicle
12. Remove tire and inspect interior and bead
13. Repair tire
14. Mount tire
15. Repack, adjust front wheel bearings
16. Lubricate speedometer cable and housing

### DUTY: PERFORM EVALUATION AND INSPECTION ACTIVITIES

Tasks:

1. Analyze causes of vehicle failures
2. Conduct spot checks on malfunctions and report any defects
3. Evaluate training programs
4. Inspect and test windshield-wiper motor, blades, and arms
5. Inspect tires and wheels
6. Inspect vehicles for compliance with local laws
7. Inspect vehicles for mirrors
8. Inspect vehicles received or sold by an organization, perform inspections on vehicle conditions and prepare inspection reports

Source:
Occupational Analysis, Colorado State University, Fort Collins, CO
Task/Activity Analysis, Ohio State University, Columbus, OH

## Auto Mechanics
## TRANSMISSIONS

DUTY: INSTALL AND REPAIR AUTOMATIC TRANSMISSIONS

Tasks:

1. Raise vehicle and install jack stands
2. Drain transmission fluid
3. Support engine
4. Remove drive shaft
5. Disconnect converter from flywheel
6. Remove transmission mounts and frame cross member
7. Disconnect linkages, cables, tubes, lines and wires
8. Remove transmission from engine bolts
9. Remove transmission and converter as a unit
10. Repair transmission or secure replacement
11. Reverse procedure for installation of components
12. Fill transmission with lubricant
13. Check for leaks
14. Lower vehicle
15. Perform operational check

Source:
Occupational Analysis, Colorado State University, Fort Collins, CO
Task/Activity Analysis, Ohio State University, Columbus, OH

## Auto Mechanics
## TUNE-UP

### DUTY: PERFORM EVALUATION AND INSPECTION ACTIVITIES

Tasks:

1. Analyze causes of vehicle failures
2. Conduct spot checks on malfunctions and report any defects
3. Evaluate training programs
4. Inspect and test windshield wiper motor, blades, and arms
5. Inspect tires and wheels
6. Inspect vehicles for compliance with local laws
7. Inspect vehicles for mirrors
8. Inspect vehicles received or sold by an organization, perform inspections on vehicle conditions and prepare inspection reports

### DUTY: SERVICE AND REPAIR IGNITION SYSTEMS

Tasks:

1. Verify complaint
2. Check and set dwell
3. Check and adjust timing
4. Service or replace spark plugs
5. Isolate miss
6. Check and replace points and condensor
7. Check and replace ignition primary resistor
8. Check and replace ignition coil
9. Test plug wires
10. Test cold start circuit
11. Strobe distributor
12. Service and repair transistor amplifier
13. Service and repair ballast resistor
14. Service and repair pick up coil
15. Adjust reluctor air gap

### DUTY: SERVICE AND REFAIR EMISSION SYSTEMS

Tasks:

1. Service engine breathing systems
2. Service air inductions system
3. Service spark timing control
4. Service evaporative emission system
5. Service exhaust gas control system - catalytic converter
6. Service heated air system

Source:
Occupational Analysis, Colorado State University, Fort Collins, CO
Task/Activity Analysis, Ohio State University, Columbus, OH

## DUTY: SERVICE AND REPAIR CHARGING SYSTEMS

Tasks:

1. Test battery
2. Test charging circuits
3. Service or replace battery
4. Repair charging circuit

## DUTY: SERVICE AND REPAIR ACCESSORY SYSTEMS

Tasks:

1. Test lighting circuits
2. Repair lighting circuits
3. Test radio
4. Replace radio components
5. Test windshield wipers
6. Repair windshield wipers
7. Test blower motor
8. Service blower motor
9. Adjust headlights

## DUTY: SERVICE AND REPAIR CRANKING SYSTEMS

Tasks:

1. Test cranking voltage
2. Test starter motor
3. Repair starter circuit

Source:
Occupational Analysis, Colorado State University, Fort Collins, CO
Task/Activity Analysis, Ohio State University, Columbus, OH

## AUTO BODY

### DUTY: REFINISH

Tasks:

1. Wash and dewax vehicle
2. Ascertain type of original finish and type to be used
3. Inspect for surface defects
4. Featheredge broken surfaces
5. Treat bare metal chemically
6. Remove decorative trim and mask
7. Mix and apply primer/surfacer and putty
8. Prepare for color coats
9. Apply top coats
10. Polish and wax
11. Spray guns and paint equipment
12. Apply stripe and decals
13. Clean up and prepare for delivery

### DUTY: REPAIR AND PATCH DAMAGES

Tasks:

1. Determine direction of force or impact
2. Determine extent of damage
3. Rough Out damaged panels
4. Sheet metal patches
5. Shrink metal

### DUTY: REPAIR FRAME DAMAGE

Tasks:

1. Repair frame damage
2. Remove steering and suspension system

### DUTY: REMOVE AND REPLACE PANELS

Tasks:

1. Prepare for panel removal
2. Remove bolted or screwed on panels
3. Replace bolted or screwed on panels
4. Remove and replace bolted on parts
5. Remove permanently attached panels and prepare for replacement
6. Replace permanent panels
7. Remove and replace glass

## DUTY: TRIM, HARDWARE, ADJUSTMENTS

Tasks:

1. Remove and install trim and trim panels
2. Adjust trim or panels
3. Remove and replace interior trim
4. Maintain trim

## DUTY: FIBERGLASS PROCESS

Tasks:

1. Repair and replace fiberglass
2. Fabricate a fiberglass panel

## DUTY: WELD

Tasks:

1. Set up and test oxyacetylene equipment
2. MIG weld (Metal Inert Gas)
3. Resistance weld

Source:
Occupational Analysis, Colorado State University, Fort Collins, CO
Task/Activity Analysis, Ohio State University, Columbus, OH

## Appendix C

# Samples of Actual On-The-Job Reading and Writing Materials

## Introduction

The samples included in this Appendix are copies of actual work orders, estimates, manufacturers' manuals, instructions on product labels, parts installation instructions, and instructions for conducting safety inspections in Utah.

These are all materials that involve AM and ABW reading and writing. They have been included because the materials search uncovered very few vocationally specific materials, leaving teachers with the responsibility for materials development. Perhaps these samples can be useful for that purpose.

The company names have been changed, unless permission was given to print the material as is. Everything else is exactly as an entry-level AM or ABW would encounter it on the job.

# SAMPLES OF FORMS

AUDI 100LS

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|---|---|---|---|---|---|
| COLOR SILVER | LIC NO. HDL947 | VEH I.D. NO. | YR. MFR. 73 | ~~3399 So. 300 West~~ HOLIDAY INN NC TEMPLE | Salt Lake City, Utah 84115 |

V.I.N. NO. S 8 1 3 1 1 3 5 0 3 9 9

I hereby authorize the repair work herein set forth to be done along with the necessary materials. I hereby grant you and/or your employees permission to operate the vehicle herein described on streets, highways or elsewhere for the purpose of testing and/or inspection. An express mechanic's lien is hereby acknowledged on said vehicle to secure the amount of repairs thereto. Receipt of vehicle described herein for repair or alteration is hereby acknowledged by the dealer. Said customer is hereby notified that the said vehicle is not insured or protected to the amount of actual cash value thereof, or otherwise, by the dealer against loss occasioned by theft, fire or vandalism while the property remains with dealer. Customer states no articles of personal property have been left in the vehicle and dealer is not responsible for inspection therefor. Storage charges of $2.00/day will commence 48 hours after repairs are completed. Estimated cost of repair (if given) is only an estimate and any repairs which amount to 10% or more of original estimate may be authorized by telephone

ALL PARTS INSTALLED ARE NEW UNLESS SPECIFIED OTHERWISE. ALL PARTS DESIGNATED "EXCHANGE" OR "EXCH." AND ALL PART NUMBERS ENDING IN "X" OR "V" MAY BE REBUILT OR RECONDITIONED PARTS

☐ SAVE • DISCARD ☐ OLD PARTS

SPECIAL REPAIR CONDITIONS

THE UNDERSIGNED HEREBY ACKNOWLEDGES THAT IT MAY BE NECESSARY TO REMOVE AND DISMANTLE THE UNIT OF THE VEHICLE DESCRIBED IN THIS REPAIR ORDER IN ORDER TO FULLY ASCERTAIN THE PROBLEMS ASSERTED BY THE UNDERSIGNED. IT IS AGREED THAT THE DEALER (MR. VOLKSWAGEN) SHALL NOT BE REQUIRED TO RESTORE OR REASSEMBLE ANY SUCH UNITS UNLESS THE UNDERSIGNED AND THE DEALER FIRST AGREE IN WRITING TO SUCH RESTORATION.

CUSTOMER ACKNOWLEDGES RECEIPT OF A COPY HEREOF.

CUSTOMER SIGNATURE X Joan J. Brown

BUSINESS PHONE

HOME PHONE 535-2455

SERVICE ADVISOR

NAME JOAN BROWN

STREET ADDRESS 166 BROWING

CITY STATE & ZIP CODE 84105, SLC

NOTICE OF WARRANTY DISCLAIMERS. With the exception of limited warranties provided by the manufacturer, the items or item described hereon are sold as is by MR. VOLKSWAGEN.

Any warranties applying to the items or item described hereon are those offered by the manufacturer. MR. VOLKSWAGEN hereby expressly disclaims all warranties, either express or implied, including, but not limited to, the implied warranties of merchantability or fitness for a particular purpose or use, and neither assumes nor authorizes any other person to assume for it any liability in connection with the sale of these items or item.

Buyer shall not be entitled to recover from MR. VOLKSWAGEN any consequential damages, damage to property, damages for loss or use, loss of time, loss of profits, or income, or any incidental damages.

PRESENT MILEAGE W.C. 99,959

ELAPSED MILEAGE W.C.

REPAIR DATE 4/28/81

DELIVERY DATE

DATE INST.

TIME RECEIVED AM PM

TIME PROMISED AM PM

QUALITY CONTROL

MECHANIC NO.

SUPERVISOR INITIALS

| GENERAL SERVICE | TIME UNITS | AMOUNT |
|---|---|---|
| LUBRICATION SERVICE | | |
| MINOR MAINTENANCE SERVICE | ✓ | 19 95 |
| STATE INSPECTION | | |
| STEAM CLEAN ENG. ☐ TRAN. ☐ | | |
| FUEL INJ. TEST MPC AFC CIS & DIESEL | | |
| ELECT. OUTPUT & CONSUMPTION TEST | | |
| ENG. PERF. TEST — 1700 C.C. TWIN CARB. | | |
| CARBURETION & FUEL SUPPLY SERVICE | | |
| TOTAL | | |

| ADDITIONAL SERVICE EVERY 30,000 MILES OR 2 YEARS | REPL. BR. FLUID ☐ | REPK. CV JTS ☐ | REPK. RW BRG. ☐ | REPK. FW BRG. ☐ | CHG. TR. FL. ☐ | COMP. COOL SYS. SERVICE | DIESEL INJ. TEST ☐ |
|---|---|---|---|---|---|---|---|
| | TIME UNITS | TIME UNITS | TIME UNITS | TIME UNITS | TIME UNITS | TIME UNITS | TIME UNITS |

| COST | QTY | W.C. | PART NO. | DESCRIPTION | AMOUNT |
|---|---|---|---|---|---|
| | | | | | |

ADDITIONAL PARTS SEE COPY ATTACHED

ACCESSORIES

| W.C. | OPER. NO. | TIME UNITS | REPAIR DESCRIPTION | INT. | WARR. | AMOUNT |
|---|---|---|---|---|---|---|
| | | | MINOR TUNE UP | | | — |
| | | | TOTAL | | | |

PAI

APR 28 1981

CHECK 56

COMPRESSION TEST OR CYLINDER LEAKAGE TEST

| PRELIMINARY ESTIMATE | REVISED ESTIMATE | NOTIFIED BY | OK'D BY | DATE | TIME | AM PM ☐ | BY PHONE • IN PERSON ☐ |
|---|---|---|---|---|---|---|---|
| $ | $ | | | | | | |

* EXHAUST MANIFOLD LEAK (6 BOLT FLANGE)
* BAD CARBURATOR-
DWELL WAS OFF

— PARTS ARE NEW —

197

WARRANTY COMMENTS

| | | | |
|---|---|---|---|
| SUBLET | | QTY. | QTS. ANTI-FZ. @ |
| P. O. | | | QTS. OIL @ |
| P. O. | | | PTS. TRANS. FL. @ |
| TOTAL | | | TOTAL |

| | |
|---|---|
| CUSTOMER NO. | |
| MECHANICAL LABOR | |
| LABOR OTHER MAKE | 198 |
| OTHER SHOP | |
| OIL & GREASE | |
| SUBLET REPAIRS | |
| PARTS | |
| ACCESSORIES | |
| OTHER PARTS & ACCESSORIES | |
| SUB-TOTAL | 19 |
| SALES TAX | |

BEST COPY AVAILABLE

[redacted]

**92192** | 420 | E01

REPAIR ORDER NO. 92192 Z (NO SERVICE FOLLOW-UP)

232

I hereby aut[illegible] and/or your [illegible] for the purp[illegible] truck to sec[illegible] pay reason[illegible] Customer [illegible] to the own[illegible] cloned by [illegible] articles of [illegible] therefor.

work to be done along with the necessary material, and hereby grant you [illegible] operate the car or truck herein described on streets, highways or elsewhere [illegible] thereof. An express mechanic's lien is hereby acknowledged on above car or [illegible] thereto. In the event legal action is necessary to enforce this contract, I will [illegible] of costs.

[illegible] vehicle described on this repair order is not insured or protected [illegible] thereof, or otherwise, by the undersigned dealer against loss occa- [illegible] while the property remains with the dealer. Customer states no [illegible] been left in the vehicle, and dealer is not responsible for inspection [illegible] TO TERMS ON REVERSE SIDE.

X Juan [illegible]
CUSTOMER ACKNOWLEDGEMENT

$ 875.00
ESTIMATE

| ADDITIONAL AUTH. AMT. | TIME | BY |
|---|---|---|
| $ | | |
| $ | | |
| TOTAL $ | | |

21

CUSTOMER NAME, ADDRESS, ZIP CODE
Juan [illegible]
166 Browning
SLC UT 84105

☐ RETAIN PARTS ☐ DESTROY PARTS

USE THIS CONTROL NUMBER WHEN INQUIRING ABOUT YOUR CAR

| | |
|---|---|
| MILEAGE | 99957 |
| ELAPSE MILEAGE - SPARE PT. WTY. | |
| CHASSIS NO. | 8131138399 |
| REPAIR DATE | / / |
| MODEL | 8101 |
| DEL DATE | / |
| MODEL YR. | 73 |
| SERV. ADV. | 1 |
| LICENSE NO. | HD [illegible] 47 |
| USED VEHICLE STOCK NO. | |

blue

☐ CASH ☐ CHARGE OK'D BY

TELEPHONE-BUS. 533- TELEPHONE-RES. 4009

TIME PROMISED

QUALITY CONTROL INSPECTOR

| BY | TYPE SERVICE | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| | 1 OIL CHANGE | | | | |
| | 2 DIAGNOSIS | | | | |
| | 3 MAINTENANCE | | | | |
| | 4 OTHER LISTED BELOW | | | | |

| QTY. | P/NUMBER | DESCRIPTION | PRICE | |
|---|---|---|---|---|
| 8 | A | Valve guides | 31 | 60 |
| ~~8~~ | ~~059 109 675~~ | ~~guide [illegible]~~ | ~~11~~ | ~~11~~ |
| 8 | 059 109 675 | [illegible] | 12 | 00 |
| 3 | ~~A~~ | ~~Guides~~ | 8 | 25 |
| 1 | 059 198 041 | Pan Set | 11 | 50 |
| 1 | ASP 001 35 | Head Set | 37 | 40 |
| 10 | N44 4113 | Studs | 7 | 00 |
| [illegible] | 059 127 601 | Nuts | 7 | 00 |
| 8 | N115586 | Washer | 4 | 80 |
| 1 | ASP 00 150 | Rings | 71 | 25 |
| 1 | ASP 00 195 | Bear | 22 | 55 |
| 1 | ASP 00 [illegible] | | 39 | 70 |
| 1 | 803 [illegible] | Valve | 25 | 35 |
| ACCESSORIES | | | | |
| 1 | DLR 001 144 | Coolant | 4 | 79 |

ALL PARTS INSTALLED ARE NEW UNLESS SPECIFIED OTHERWISE

SUBLET REPAIRS ARE NOT GUARANTEED BY DAVE STRONG'S PORSCHE-AUDI, INC.

| | | |
|---|---|---|
| SUBLET | GAL. GAS @ | |
| P.O. | 4 QTS. ENG. OIL @ | 8.00 |
| P.O. | PTS. TRANS. OIL @ | |

| W | DAMAGE CODE | WTY. CODE | W | DAMAGE CODE |
|---|---|---|---|---|
| | | | | |

| DESCRIPTION | OPERATION | TIME UNITS | $ AMOUNT |
|---|---|---|---|
| Rpr oil use - poor running | | | |
| R+R pistons Rpl Rings, Rod bearings | | | |
| [illegible] Main bearings, Grind | | 1550 | 465.00 |
| Valves + Seats Rpl Valve Guides | | | |
| 6441 | | | |
| Rpl [illegible] water Valve | | 100 | 30.00 |
| [illegible] overhaul | | 200 | 60.00 |
| [illegible] Surfaces | | | |

[illegible] parts listed are not factory original, per customer's request. [illegible] are warranted for a [illegible] months or 3,000 miles [illegible] occurs first.

E /COMMENTS/

TC TOWING CHARGE

RETURN IN 800-1000 MILES FOR MOTOR CHECK AND OIL CHANGE

| | |
|---|---|
| CUSTOMER NO. | 1306 |
| MECHANICAL LABOR | 555.00 |
| OTHER SHOP | |
| OIL & GREASE | 8.00 |
| SUBLET REPAIRS | |
| PARTS | 300.10 |
| ACCESSORIES | 4.79 |
| OTHER PARTS & ACC. | |
| | 20.28 |
| | |
| SALES TAX | 44.41 |
| SUB TOTAL | 932.58 |
| TOTAL | 5.00 |
| | 7 |

200

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CUST. NO. STOCK NO. TAG NO. COLOR ADDITIONAL R.O. NO. DOC #

233

| R.O. NUMBER | DATE | VEHICLE IDENTIFICATION NO. | MILEAGE | DELIVERY DATE | LICENSE NO. | YEAR | MAKE - MODEL |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

☐ CASH

☐ CARD

☐ INT.

☐ CHARGE

CUSTOMER ACKNOWLEDGES RECEIPT OF COPY HEREOF.

**OUR TERMS ARE CASH OR APPROVED CREDIT CARD**

X

I HEREBY AGREE THAT YOU ARE NOT RESPONSIBLE FOR ANY DELAYS CAUSED BY UNAVAILABILITY OF PARTS OR DELAYS IN PARTS SHIPMENTS BY THE SUPPLIER OR TRANSPORTER. I FURTHER AGREE THAT YOU ARE NOT RESPONSIBLE FOR LOSS OR DAMAGE TO CARS OR TRUCKS OR PROPERTY LEFT IN CARS OR TRUCKS IN CASE OF FIRE, THEFT OR ANY OTHER CAUSE BEYOND YOUR CONTROL.

I hereby authorize the above repair work to be done along with the necessary material, and hereby grant you and/or your employees permission to operate the car or truck herein described on streets, highways or elsewhere for the purpose of testing and/or inspection. An express mechanic's lien is hereby acknowledged on above car or truck to secure the amount of repairs thereto. I further agree to pay the sum of $1.50 per day for storage of the car or truck commencing five (5) days after receiving notice that the service requested or repair work has been completed. Storage fees shall be payable daily. I hereby expressly grant to Jerry Seiner Chevrolet, Inc. a lien upon the car or truck herein described for payment of such storage costs and agree that Jerry Seiner Chevrolet, Inc., may detain the same at any time such car or truck is lawfully in its possession until storage costs are paid. Such lien may be foreclosed in such manner as is provided for the foreclosure of mechanic's liens under the laws of the State of Utah. The undersigned agrees to pay this account at the office of Jerry Seiner Chevrolet, Inc. 730 West 2100 South, Salt Lake City, Utah. In the event the account above referred to is placed in the hands of an attorney for collection, the abovesigned agrees to pay all costs thereof, including a reasonable attorney's fee.

**NO VEHICLES RELEASED AFTER 8:00 P.M. OR ON SATURDAY.**

NAME

ADDRESS

CITY/STATE

BILL TO:

CUST. P.O. NO.

TIME IN ☐ AM ☐ PM

TIME PROMISED ☐ AM ☐ PM

PHONE WHEN READY

RESIDENCE PHONE

BUS. PHONE

| ORIG. EST. | LABOR | PARTS | TOTAL | REV. EST. | LABOR | PARTS | TOTAL | ADD'L REPAIRS OK'D BY | DATE | TIME | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | X | | | ☐ BY PHONE<br>☐ IN PERSON |

SUPPLIES: A token charge equivalent to 7% of the labor charge is included for supplies used on your vehicle. Applicable supply items are: Nuts, bolts, washers, tape, pins, aerospray, shellac, solvent, rags, carburetor cleaner, towels, caulking, battery cleaner, wire, window sealer, etc. Maximum charge is $14.00

| OFF | QTY | DESCRIPTION/PART NO. | SALE | |
|---|---|---|---|---|
| | 1 | DESC. Motor<br>PART NO. 22030809 | | |
| | | DESC.<br>PART NO. | | |
| | | DESC.<br>PART NO. | | |
| | | DESC.<br>PART NO. | | |
| | | DESC.<br>PART NO. | | |
| | | DESC.<br>PART NO. | | |
| | | DESC.<br>PART NO. | | |
| | | DESC.<br>PART NO. | | |
| | | DESC.<br>PART NO. | | |

| | F.C. | OPERATION | UNITS | MECH NO. | INSTRUCTIONS | REPAIR LABOR |
|---|---|---|---|---|---|---|
| A | | P.I. | | | C W/ WIPERS WILL NOT | |
| B | | | | | C SHUT OFF | |
| C | | | | | C (S.O PART IN) | |
| D | | | | 9P | | |
| E | | | .5 | 10 | C wipers insp - won't | |
| F | | | | 18 | C shut off OK By Lynn | |
| G | | | | | C to replace mtr. | |
| H | | | | | | |
| I | | | | | C | |
| J | | | | | C | |
| K | | | | | C | |
| L | | | | | | |

MILE/MONTH MAINTENANCE SERVICE

R.O. 24774 CUST NO. K I MILEAGE K C 9998 K I SERVICE ADVISOR K C 8854 K I

SPECIAL ORDER PARTS DATE

SPECIAL ORDER PARTS ORDER NO.

P.O. NO.

SUBLET REPAIRS

QTS. OIL @

LBS. GREASE @

QTS. AUTO. TRANS. FLUID @

201

| DESCRIPTION | AMOUNT |
|---|---|
| LABOR MECHANICAL | |
| LABOR BODY SHOP | |
| SUBLET REPAIRS | |
| PARTS & ACCESS. MECHANICAL | |
| PARTS & ACCESS. BODY SHOP | |
| TIRES | |
| GAS, OIL & GREASE | |
| PAINT & MATERIAL | |
| MISC. MATERIAL | |
| | |
| SUB-TOTAL | |
| SALES TAX | |
| | |
| CHARGE SALES | |
| CASH SALES | |

| UNITS | MECH NO. | | MAINT. FAST SERVICE |
|---|---|---|---|
| | | 1. | LUBRICATIC |
| | | 2. | OIL & BELTS |
| | | 3. | OIL FILTER |
| | | 4. | WHEEL BEARINGS |
| | | 5. | PCV SYSTEM |
| | | 6. | BRAKES |
| | | 7. | TRANSMISSI |
| | | 8. | EXHAUST |
| | | 9. | TIRES |
| | | 10. | WHEEL BALANCE |
| | | 11. | SUSPENSIO ALIGNMENT |
| | | 12. | SUSPENSIO |
| | | 13. | EMISSION CONTROL |
| | | 14. | E.C.S. |
| | | 15. | IGNITION |
| | | 16. | COOLANT |
| | | 17. | FUEL FILTER |
| | | 18. | A/C & HEATING |
| | | 19. | HEADLIGHTS |
| | | 20. | WASH |
| | | 21. | POLISH |
| | | 22. | UNDERBODY |
| | | 23. | OWNER CHECKS |
| | | | MAJOR MECH. |
| | | 25. | ENGINE COOLING SYSTEM |
| | | 26. | ELECT-CHARGING SYSTEM |
| | | 27. | LIGHT ENGINE REPAIR |
| | | 28. | STATE INSPECTION |
| | | 29. | TRANS REPAIR |
| | | 30. | DRIVE LINE |

20

FOR TIME
ENTORY CONTROL
PURPOSE ONLY

AUTOMOTIVE SERVICE
NSULTANTS INC.
971 ALL RIGHTS
RE

LIMITED WARRANTY-PARTS AND LABOR GUARANTEED 90 DAYS OR 4000 MILES-WHICHEVER [illegible] FIRS

BEST COPY AVAILABLE

86570 | 420 | E01

REPAIR ORDER NO. 6570

DATE 4/17/81

(NO SERVICE FOLLOW-UP)

234

work to be done along with the necessary material, and hereby grant you … operate the car or truck herein described on streets, highways or elsewhere … tion. An express mechanic's lien is hereby acknowledged on above car or … thereto. In the event legal action is necessary to enforce this contract, I will … costs

… vehicle described on this repair order is not insured or protected … thereof, or otherwise, by the undersigned dealer against loss occa… while the property remains with the dealer. Customer states no … been left in the vehicle, and dealer is not responsible for inspection

… TO TERMS ON REVERSE SIDE.

Joan Brown

…STOMER ACKNOWLEDGEMENT

ESTIMATE

| ADDITIONAL AUTH. AMT. | TIME | BY |
|---|---|---|
| $ | | |
| $ | | |
| TOTAL $ | | |

CUSTOMER NAME, ADDRESS, ZIP CODE

Joan Brown
166 Browning
SLC UT 84105

☐ RETAIN PARTS ☐ DESTROY PARTS

USE THIS CONTROL NUMBER
WHEN INQUIRING ABOUT YOUR CAR

| | |
|---|---|
| MILEAGE | 99159 |
| ELAPSE MILEAGE - SPARE PT. WTY. | |
| CHASSIS NO. | 8131138399 |
| REPAIR DATE | / / |
| MODEL | 8101 |
| DEL DATE | / |
| MODEL YR. | 73 |
| SERV. ADV. | 7 |
| LICENSE NO. | UDJ 47 |
| USED VEHICLE STOCK NO. | |

blue

☐ CASH ☐ CHARGE OK'D BY

TELEPHONE-BUS. TELEPHONE-RES.

TIME PROMISED WAIT

QUALITY CONTROL INSPECTOR

| BY | TYPE SERVICE | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| | 1 OIL CHANGE | | | | |
| | 2 DIAGNOSIS | | | | |
| | 3 MAINTENANCE | | | | |
| | 4 OTHER LISTED BELOW | | | | |

| P/ | NUMBER | DESCRIPTION | PRICE | DESCRIPTION | OPERATION | TIME UNITS | AMOUNT |
|---|---|---|---|---|---|---|---|
| A | | Shocks<br>803 412 031 | 73 20 | Check Shocks | | | |
| N | 10 1841 | Bolt | 2 80 | Rpl front shocks | | 200 | 56 00 |
| N | 22 1414 | Nuts. | 1 80 | Cut off Mounting bolts both sides | | 200 | 56 00 |
| | 803 407 181 | bush | 25 10 | | | | |
| | 803 407 183 | bush. | 25 10 | Rpl Lower A. Arm bushings | | 300 | 84 00 |

E /COMMENTS/

TC TOWING CHARGE

PAID
APR 17 1981
…HF AUDI

ALL PARTS INSTALLED ARE NEW
UNLESS SPECIFIED OTHERWISE

ACCESSORIES

…LET

…

203

| | |
|---|---|
| GAL. GAS @ | |
| QTS. ENG. OIL @ | |
| PTS. TRANS. OIL @ | |

DAMAGE CODE / WTY. CODE W/ DAMAGE CODE /

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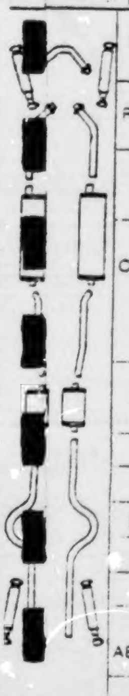
| | |
|---|---|
| CUSTOMER NO. | f306 |
| MECHANICAL LABOR | 196 00 |
| OTHER SHOP | |
| OIL & GREASE | |
| SUBLET REPAIRS | |
| PARTS | 128 00 |
| ACCESSORIES | |
| OTHER PARTS & ACC. | |
| | 393 |
| SALES TAX | |
| SUB TOTAL | |
| TOTAL | |

204

| | | | |
|---|---|---|---|
| NAME Charlotte Brown | | PHONE NO. | DATE [illegible] |
| ADDRESS 166 Browning Ave. | CITY/STATE | ZIP | IDENTIFICATION | ORDER TAKEN BY [illegible] |

| YEAR | MAKE | MODEL | MILEAGE | LIC. PL. NO. | RESALE | OVER THE COUNTER | JOB FINISHED BY |
|---|---|---|---|---|---|---|---|
| [illegible] | Audi | 100 LS | | | | | [illegible] |

| CASH | CHECK | BANKCARD | CHARGE | DIAL | CREDIT MEMO | RECD ON ACCT | PAID OUT | PURCHASE ORDER NO. |
|---|---|---|---|---|---|---|---|---|
| | ✓ | | | | | | | |



| ITEM | | QUAN. | PART NO. | DESCRIPTION | UNIT PRICE | AMOUNT |
|---|---|---|---|---|---|---|
| MUFFLER | R | | | | | |
| | L | | | | | |
| RESONATOR | R | | | | | |
| | L | | | | | |
| TAIL PIPE | R | | | | | |
| | L | | | | | |
| CONNECTOR PIPE | RF | | | | | |
| | RR | | | | | |
| | LF | | | | | |
| | LR | | | | | |
| EXHAUST PIPE | RF | 1 | 4E | 6626 # | | 6 95 |
| | LF | | | | | |
| CLAMPS | | 1 | | | | 1 00 |
| BRACKETS | | | - | | | |
| EXTENSIONS | | | | | | |
| GASKETS | | 1 | 1641 | | | 1 20 |
| WELDS | | | | | | |
| SHOCK ABSORBERS | F | | | | | |
| | R | | | | | |
| SPRINGS | | | | | | |
| BRAKE LININGS | RF-LF | | | | | |
| | RR-LR | | | | | |
| WHEEL CYLINDERS NEW-REBUILT | RF-LF | | | | | |
| | RR-LR | | | | | |
| DRUMS REFACE-NEW | RF-LF | | | | | |
| | RR-LR | | | | | |

**YOUR COMMENTS ARE WELCOME**

[illegible]
SALT LAKE CITY, UTAH 84115

| | |
|---|---|
| PARTS TOTAL | |
| LABOR | 12 50 |
| SUB TOTAL | 92 55 |
| SALES TAX | 4 18 |
| TOTAL | 96 74 |

## ESTIMATE OF REPAIRS

| | |
|---|---|
| PARTS TOTAL | |
| LABOR | [illegible] |
| SUB TOTAL | [illegible] |
| SALES TAX | [illegible] |
| TOTAL | [illegible] |

## WORK AUTHORIZATION

I hereby authorize the repair work to be done. You and your employees may operate vehicle for purposes of testing, inspection or delivery at my risk. An express mechanic's lien is acknowledged on above vehicle to secure the amount of repairs thereto. You are not to be held responsible for loss or damage to vehicle or articles left in vehicle in case of fire, theft, accident or any other cause beyond your control. I also acknowledge receipt of a copy of this work authorization and estimate of repairs.

X ____________
Customer's Signature

**RETURN PARTS ?**

YES ☐ ☐ NO

**Additional Authorized Amount.**

$ ____________

X ____________
Customer's Signature

**Below Explanation Is Applicable Only When Non - Midas Brand Products, Glasspacks, and Foreign Car Mufflers Are Purchased.**

I have read and signed this explanation prior to the installation of these parts and I understand I am not purchasing these (Mufflers) (Shocks) do not carry the I have been given a written guarantee for each guaranteed product and I understand the terms and that the guarantee will be honored only by the Shops listed above and that guarantee certificate must be presented at the time replacement is desired. Glasspack mufflers are NOT guaranteed for NOISE LEVEL nor to pass the Local Utah Noise Level (decibel) laws. Glasspacks do become louder in time and must be replaced when they exceed legal decibel limits.

X ____________
SIGNATURE OF PURCHASER

COLLECTED BY ____________

CHARGE ACCEPTED BY ____________

SH [illegible]

235

This Is Your INVOICE - NOT Your GUARANTEE CERTIFICATE

BEST COPY AVAILABLE

236

R.O. NO. 63515 | 420 | E01

REPAIR ORDER NO. 63515

DATE / /
(NO SERVICE FOLLOW-UP)

following repair work to be done along with the necessary material and hereby grant you ... permission to operate the car or truck herein described on streets, highways or elsewhere ...ing and/or inspection. An express mechanic's lien is hereby acknowledged on above car or ...ount of repairs thereto. In the event legal action is necessary to enforce this contract I will ...y's fees and court costs.

...ed that the vehicle described on this repair order is not insured or protected ...ual cash value thereof or otherwise by the undersigned dealer against loss ... or expedition while the property remains with the dealer. Customer states no property have been left in the vehicle, and dealer is not responsible for inspection...

[illegible] understand the terms and conditions [illegible] the same

...NOWLEDGEMENT

$ ______ ESTIMATE

| ADDITIONAL AUTH. AMT. | TIME | BY |
|---|---|---|
| $ | | |
| $ | | |
| TOTAL $ | | |

CUSTOMER NAME, ADDRESS, ZIP CODE

☐ RETAIN PARTS ☐ DESTROY PARTS

USE THIS CONTROL NUMBER
WHEN INQUIRING ABOUT YOUR CAR

MILEAGE
ELAPSE MILEAGE - SPARE PT. WTY.
CHASSIS NO.
REPAIR DATE / /
MODEL
DEL DATE /
MODEL YR.
SERV. ADV.
LICENSE NO.
USED VEHICLE STOCK NO.

☐ CASH ☐ CHARGE OK'D BY
TELEPHONE-BUS.
TELEPHONE-RES.
TIME PROMISED

| | TYPE SERVICE | ✓ |
|---|---|---|
| 1 | CUSTOMER | |
| 2 | INTERNAL | |
| 3 | WARRANTY | |
| 4 | | |

| COST | QTY | P/ NUMBER / | DESCRIPTION | P $ PRICE | DESCRIPTION | OPERATION | TIME UNITS | L $ AMOUNT |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

ALL PARTS INSTALLED ARE NEW
UNLESS SPECIFIED OTHERWISE

ACCESSORIES

SUBLET REPAIRS ARE NOT GUARANTEED BY
DAVE STRONG'S PORSCHE-AUDI, INC.

SUBLET
P.O.
P.O.

GAL. GAS @
QTS. ENG. OIL @
PTS. TRANS. OIL @

E /COMMENTS/
TC TOWING CHARGE

| | | |
|---|---|---|
| | 9 | c |
| LBR. | 9 4405 | |
| | 9 | |
| OIL | 9 4451 | |
| SUB. | 9 4492 | c |
| PTS. | 9 4705 | c |
| ACC. | 9 4715 | c |
| | 9 | c |
| | 9 | c |

| | | |
|---|---|---|
| INV.-NEW | 9 1402 | + |
| INV.-USED | 9 1412 | + |
| CUSTOMER RELATIONS & ADJUSTMENTS | 9 6_03 | + |
| VEH. MAINT. | 9 6_08 | + |
| USED GUARANTEE WARRANTY | 9 6_12 | + |
| COMEBACKS | 9 6441 | + |
| | 9 | + |
| TRANS. DAMAGE | 9 1334 | + |
| DIAG. W | 9 1352 | + |
| NEW INV. | 9 1402 | - |

WARRANTY
QUALITY INSPECTED BY

| | | |
|---|---|---|
| ACCESS. | 9 4713 | c |
| LBR. | 9 4403 | |
| PTS. | 9 4703. | c |
| SUB. | 9 4491 | c |

| | | |
|---|---|---|
| WTY. REC. | 9 1332 | + |
| RECALL REC. | 9 1354 | + |
| | 9 | + |

CUSTOMER NO. f 3 0 6

| | | |
|---|---|---|
| MECH. LABOR | 9 4401 | - |
| OTHER SHOP | 9 4421 | c - |
| OIL & GREASE | 9 4451 | - |
| SUBLET | 9 4491 | c - |
| PARTS | 9 4701 | c - |
| ACCESS. | 9 4711 | c - |
| OTHER P & A | 9 4721 | c - |
| | 9 6442 | |
| | 9 | |
| TAX | c 2221 | |
| SUB TOTAL | | |
| CHARGE | 9 130[illegible] | |
| CASH | [illegible] 1180 | |

| WTY. CODE | W/ DAMAGE CODE / | WTY. CODE | W/ DAMAGE CODE / |
|---|---|---|---|
| | | | |

CUS[illegible] SIGN[illegible] IS RE[illegible]DER A[illegible]WLED[illegible]ADING AND AGREE[illegible] TO LIMITED WARRANTY AND CONDITIONS ON REVERSE SIDE

[illegible] Los Angeles, CA | UNISET

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**TEST**

16-000 SERIES
ENGINE ANALYZER

# Diagnostic Inspection Report

NAME
ADDRESS
DATE
CAR MAKE
CITY
PHONE
YEAR
LICENSE NUMBER
STATE
MILEAGE
JOB NUMBER
TRANSMISSION AUTO ☐ MAN ☐
ENGINE CYL'S
C.I.
H.P.
CARBURETION
ACCESSORIES A/C ☐ PS ☐ PB ☐

| VISUAL | GOOD | MARG | FAIL | NOTES |
|---|---|---|---|---|
| 1 BATTERY & CABLE INSPECTION | | | | |
| 2 AIR FILTER CONDITION | | | | |
| 3 OIL LEVEL & CONDITION | | | | |
| 4 TRANSMISSION FLUID CONDITION | | | | |
| 5 STEERING FLUID LEVEL | | | | |
| 6 OIL/FLUID LEAKAGE | | | | |
| 7 BELT TENSION & CONDITION | | | | |
| 8 COOLING SYSTEM CONDITION | | | | |
| CRK KILL ☐ STARTING | | | | |
| 9 INITIAL BATTERY VOLTAGE | | | | |
| 10 CRANKING VOLTAGE | | | | |
| 11 CRANKING SPEED | | | | |
| 12 CRANKING AMPS | | | | |
| 13 RECOVERY VOLTAGE | | | | |
| 14 POINTS RESISTANCE | | | | |
| CHARGING ☐ CHARGING | | | | |
| 15 CURRENT LEAKAGE [KEY OFF] | | | | |
| 16 ALTERNATOR OUTPUT AMPS | | | | |
| 17 CHARGING CIRCUIT DIODES | | | | |
| 18 CHARGING VOLTAGE | | | | |
| 19 BATTERY CONDITION | | | | |
| PRIMARY DWELL ☐ PRIMARY | | | | |
| 20 DWELL ANGLE | | | | |
| 21 DWELL VARIATION | | | | |
| 22 PRIMARY RESISTANCE | | | | |
| 23 COIL/COND. OSCILLATION | | | | |
| 24 ARCING POINTS | | | | |
| 25 MECHANICAL POINT ACTION | | | | |
| TIMING ☐ TIMING | | | | |
| 26 INITIAL TIMING | | | | |
| 27 TOTAL ADVANCE | | | | |
| CENTRIFUGAL ADVANCE | | | | |
| VACUUM ADVANCE | | | | |
| 50 KV HI CO ☐ SECONDARY OUTPUT | | | | |
| 28 COIL POLARITY | | | | |
| 29 COIL OUTPUT [25 KV MIN] | | | | |
| 30 ROTOR AIR GAP | | | | |

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| K.V. | HI | HI | HI | HI | HI | HI | HI | HI |
| CYL | LO | LO | LO | LO | LO | LO | LO | LO |

| 25 KV LO CO ☐ SECOND. COND. | | | | |
|---|---|---|---|---|
| 31 PLUG FIRING VOLTAGE | | | | |
| 32 PLUG FIRING VOLTAGE [ACCELERATION] | | | | |
| 33 SECONDARY RESISTANCE | | | | |
| 34 VALVE ACTION FLUCTUATION | | | | |
| 35 PLUG FIRING TIME | | | | |
| CYL BAL ☐ CYLINDER BALANCE | | | | |
| 36 ENGINE PERFORMANCE PER CYL | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | LOW SPEED |
| | | | | | | | | HIGH SPEED |
| | | | | | | | | FIRING ORDER |

| | | | | |
|---|---|---|---|---|
| 37 MULTI CYLINDER BALANCE | | | | |
| CARB ☐ CARBURETOR | | | | |
| 38 PCV VALVE OPERATION | | | | |
| 39 ACCELERATOR PUMP OPERATION | | | | |
| 40 DASHPOT CONDITION | | | | |
| 41 IDLE MIXTURE ADJUSTMENT | | | | |
| 42 ENGINE IDLE | | | | |
| EXHAUST ANALYSIS | | | | |
| 43 EXHAUST SYSTEM CONDITION | | | | |
| 44 EXHAUST ANALYSIS [IDLE] | | | | |
| 45 EXHAUST ANALYSIS [CRUISE] | | | | |
| 46 POWER VALVE OPERATION | | | | |

COMMENTS AND RECOMMENDATIONS

DIAGNOSTICIAN'S SIGNATURE:

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2701 MILLWOOD AVE.
COLUMBIA, S. CAROLINA 29205
PHONE: 803/254-5068

CUST. ORDER NO. DATE 2-6-81 19

SOLD TO MR. Brown M☒ F☐

ADDRESS Col SC

MAKE OF CAR 1973 Audi LICENSE NO. MILEAGE

| CASH | CHARGE | ON AUT. | MDSE. RET. | PAID OUT | H | R | TV | S | REC. | PH. S. | O |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cash | | | | | | | | | | | |

| QUAN. | PART NUMBER | ARTICLES | | PRICE | AMOUNT |
|---|---|---|---|---|---|
| | | MUFFLERS | RT. | | |
| | | | LEFT | | |
| | | RESONATORS | RT. | | |
| | | | LEFT | | |
| | | TAIL PIPES | RT. | | |
| | | | LEFT | | |
| | | CON. PIPE | RT. | | |
| | | | LEFT | | 66 95 |
| 1 | 3569 | EXHAUST PIPES | FRONT | | |
| | | | REAR | | |
| 2 | | CLAMPS | | | 3 00 |
| | | HANGERS | | | |
| | | SHOCK ABSORBERS | FRONT | | |
| | | | REAR | | |
| | | COMFORT COILS | | | |
| | | | | Sub- Total | 69 95 |
| | | | | Sales Tax | 2 80 |
| | | | | Service Charge | |
| | | | | Labor Charge | 8 50 |
| | | | | TOTAL | 81 25 |

No. 26866 SALESMAN RECEIVED BY

PRINTED IN U.S.A.

THIS INVOICE DOES NOT REPLACE YOUR GUARANTEE.

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# AUTO BODY SHOP

400 S. Main St. Salt Lake City, Utah

Name ........................ Phone ........................ Date ........................

dress ........................ City ........................ State ........................

ar ............ Make ............ Style ........................ License ........................

| FRONT | LABOR | PARTS | LEFT | LABOR | PARTS | RIGHT | LABOR | PARTS |
|---|---|---|---|---|---|---|---|---|
| umper | | | Fender Frt. | | | Fender Frt. | | |
| umper Brkt. | | | Fender Shield | | | Fender Shield | | |
| Bumper Gd. | | | Fender Mldg. | | | Fender Mldg. | | |
| | | | | | | | | |
| rame | | | | | | | | |
| Cross Member | | | Headlamp | | | Headlamp | | |
| Stabilizer | | | Sealed Beam | | | Sealed Beam | | |
| Wheel | | | | | | | | |
| Hub Cap | | | Cowl | | | Cowl | | |
| Hub & Drum | | | Top | | | Top | | |
| Knuckle | | | Windshield | | | Windshield | | |
| Knuckle Sup. | | | | | | | | |
| Lr. Cont. Arm | | | Door, Front | | | Door, Front | | |
| Up. Cont. Arm | | | Door Hinge | | | Door Hinge | | |
| Tie Rod | | | Door Glass | | | Door Glass | | |
| | | | Door Mldg. | | | Door Mldg. | | |
| Steering Gear | | | | | | | | |
| Steering Wheel | | | Center Post | | | Center Post | | |
| Horn Ring | | | | | | | | |
| | | | Door, Rear | | | Door, Rear | | |
| Gravel Shield | | | Door Glass | | | Door Glass | | |
| Park Light | | | Door Mldg. | | | Door Mldg. | | |
| Rad. Grille | | | | | | | | |
| Rad. Grille | | | Rocker Panel | | | Rocker Panel | | |
| Grille Mldg. | | | Rocker Mldg. | | | Rocker Mldg. | | |
| | | | | | | | | |
| | | | Quar. Panel | | | Quar. Panel | | |
| | | | Quar. Mldg. | | | Quar. Mldg. | | |
| | | | | | | | | |
| Horn | | | | | | | | |
| Baffle, Side | | | | | | | | |
| Baffle, Lower | | | | | | MISC. | | |
| Baffle, Upper | | | REAR | | | Inst. Panel | | |
| Lock Plate | | | Bumper | | | Front Seat | | |
| Hood Top | | | Bumper Brkt. | | | | | |
| Hood Hinge | | | Bumper Gd. | | | Trim | | |
| Hood Mldg. | | | | | | Headlining | | |
| Ornament | | | Gravel Shield | | | | | |
| | | | Lower Panel | | | Tire % Worn | | |
| Radiator Sup. | | | Floor | | | Battery | | |
| R&R Radiator | | | Trunk Lid | | | | | |
| Repair Radiator | | | | | | | | |
| Recore Radiator | | | Tail Light | | | | | |
| Rad. Hoses | | | Tail Pipe | | | | | |
| Anti Freeze | | | Gas Tank | | | | | |
| Fan Blade | | | Frame | | | | | |
| Fan Belt | | | Wheel | | | PARTS | | |
| Water Pump | | | Hub & Drum | | | PAINT | | |
| Motor Mts. | | | | | | LABOR | | |

TOWING

SUNDRIES

SUB TOTAL

SALES TAX

GRAND TOTAL

**Remarks**

This is just an estimate, and does not cover additional parts & labor that may be discovered when job is opened up.

Estimator ........................ 211

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23

E-Z OUT®

[illegible]

# WAYNE'S TIRES WHOLESALE

**No.** 012099

☐ 1830 West 3500 South
West Valley, Utah 84119
Phone 972-5872

☐ 3939 South State
Salt Lake City, Utah 84107
Phone 262-2477

☐ 6790 South State
Murray, Utah 84107
Phone 566-9882

☐ 1302 South State
Salt Lake City, Utah 84115
Phone 487-2264

**NAME**

**ADDRESS**

**CITY**

| | | | |
|---|---|---|---|
| **DATE** | **CUST. ORDER NO.** | **WHEN PROMISED** | **PHONE** |

| | |
|---|---|
| **YEAR & MAKE OF CAR-TYPE OR MODEL** | **SERIAL NO.**<br>**MOTOR NO.** |

| | | |
|---|---|---|
| **LICENSE NO.** | **MILEAGE** | **WRITTEN BY** |

| AMT. | PART NO. | NAME OF PART | SALE AMT. |
|---|---|---|---|
| | | | |

SEE BACK FOR ADDITIONAL PARTS **TOTAL PARTS ▶**

**ACCESSORIES — TIRES AND TUBES**

**TOTAL ACCESSORIES ▶**

| DESCRIPTION OF WORK | AMOUNT |
|---|---|
| | |

| GAS, OIL & GREASE | | | CHECK BELOW | | | | |
|---|---|---|---|---|---|---|---|
| | | | LUBRICATE | | | LABOR ONLY | |
| GALS. GAS | | | CHANGE ENGINE OIL | | | PARTS | |
| QTS. OIL | | | TRANSMISSION | | | ACCESSORIES | |
| LBS. GREASE | | | DIFFERENTIAL | | | GAS, OIL & GREASE | |
| | | | WASH | | | MISC. MERCHANDISE | |
| | | | POLISH | | | SUBLET REPAIRS | |
| TOTAL GAS, OIL & GREASE ▶ | | | TOTAL SERVICE ▶ | | | TAX | |
| AUTHORIZED BY | | | | | | TOTAL ▶ | |

**ESTIMATES ARE FOR LABOR ONLY, MATERIAL ADDITIONAL**

[illegible]

PAY THIS AMOUNT ↑

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# SAMPLES OF MANUAL PAGES

Lifting can either be done using the chassis frame members or as shown in the photograph. If the latter method is adopted some protective material will be necessary to avoid damage to the car (photo).

### 4 Separating the transmission unit from the engine

1 Carefully clean the engine/transmission unit - particularly in the area of the engine/bellhousing joint.
2 Carefully support the unit at the engine and transmission ends, then remove the nuts and bolts which hold the two parts together. Note that the starter motor is also removed.
3 Separate the transmission unit from the engine making sure that it is pulled away squarely (photo). This avoids strain on the clutch and main shaft.
4 Note whether the engine/transmission unit dowels are in the transmission bellhousing flange or the engine flange. If one or the other is not going to be refitted to the car the dowels should be put into the part which will be refitted. Alternatively they can be removed for safety but it is imperative that they are fitted when engine and transmission unit are bolted together.
5 Put the transmission safely on one side. If there is to be some delay before any work is done on it, cover it with a polythene sheet.
6 Transfer the engine to a suitable support stand or workbench.

### 5 Removing the fan, fan support and stop pad (engine out of car)

1 Initially slacken the two screws at the outer end of the fan support and remove the belt from the fan pulley. The fan can now be removed from the support if required.
2 Now remove the three hexagon headed screws at the engine end of the support and lift the support (and fan if applicable), away from the engine.

### 6 Removing the distributor (engine out of the car)

1 To enable the distributor to be fitted in the correct position, and therefore simplify the timing procedure, it is best to note the position of certain items.
2 First set number one piston at top dead centre (tdc) on the firing stroke, using the crankshaft pulley or flywheel timing marks as appropriate. Now mark the relationship of the rotor to the distributor body and the distributor body to the cylinder block.
3 Now disconnect the pneumatic and electrical connections at the distributor.
4 Take off the distributor, either by removing the screws which secure the fixing bracket or by loosening the pinch bolt.
5 When the distributor has been lifted off, mark the position of the slot in the oil pump drive, noting that it is offset (photo).
6 Refit the distributor cap and put the parts on one side for safety.

### 7 Removing the alternator (engine out of the car)

1 Slacken all the mounting bolts and nuts, and move the alternator towards the engine to relieve drive belt tension.
2 Remove the fan and alternator drive belts.
3 Disconnect the alternator earth strap then remove all the bolts and lift the alternator away from the engine (photo).
4 Remove the slotted adjusting link.
5 Place the alternator and drive belts on one side to avoid damage.

### 8 Removing the carburettor (engine out of the car)

1 If you have removed the engine from the car you will have already removed the air cleaner. If this is not the case, the air cleaner should be removed now.
2 Disconnect the water hoses from the automatic choke (if not previously removed) (photo).
3 Detach the idle cut-off valve connections.
4 Disconnect the fuel inlet pipe (photo).
5 Remove the carburettor and its plastic cover. The nuts are difficult to get at so take care not to damage them by using unsuitable spanners (photos).
6 Put the carburettor on one side for safety, preferably wrapped in a polythene bag.

### 9 Removing the fuel pump (engine out of the car)

1 Remove the fuel outlet pipe at the pump.
2 Remove the two socket headed bolts (photo) and lift off the pump.
3 Put the pump on one side for safety, preferably wrapped in a polythene bag.
**Note:** On some cars a packing piece is fitted between the fuel pump and engine block. If one has been fitted, it should now be removed and kept with the pump.

### 10 Removing the water pump and thermostat (engine out of the car)

1 Loosen the lower hose clip on the by-pass hose. (This is the short hose above the water pump pulley).
2 Remove the two hexagon headed screws and take off the thermostat housing.
3 Remove the water pump pulley (photo). It is held by three bolts, and it will probably be necessary to prevent it from moving by wedging a screwdriver between the other bolt heads and the central spigot of the pulley.
4 Remove the hose connecting the water pump to the inlet manifold (photo).
5 Take out the water pump securing screws and put both pump and thermostat on one side. Note the length of the five screws for when replacement is required (photo).

### 11 Removing the clutch

1 Mark the relative position of the clutch and flywheel with white paint or chalk so that they can be refitted in the same position. This is because they are a balanced assembly.
2 Whilst preventing the flywheel from turning (by jamming the starter ring gear) slacken the clutch pressure plate securing screws cross-wise and evenly, then remove them in the same manner. The pressure plate and friction disc can then be lifted clear (photo).

### 12 Preparation for engine stripdown

1 If an engine support stand is available, the engine can be fitted to it to facilitate dismantling.
2 If not already carried out, remove the drain plug at the transmission end of the sump and drain off the oil into a suitable container capable of holding at least seven pints. Temporarily replace the drain plug.
3 Remove the oil filter and pressure switch (photo). Remember that some oil will spill out, so place a suitable container beneath it.
4 Thoroughly clean all the exterior surfaces of the engine. To prevent the cleaning solvents entering the oil filter drillings carefully clean this area first and mask it with adhesive tape.

### 13 Removing the cylinder head

**Note:** If this operation is to be carried out with the engine in the car it will first be necessary to drain the cooling system, remove

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4 When replacing the flap make sure that the bowden cable is still slightly tensioned to prevent the flap from rattling. Adjust the cable sleeve as necessary.

5 To remove the side window demist nozzles (the smaller of the two) a pair of pliers or the hooked end of a piece of stiff wire can be used.

6 The adjustable fresh air nozzle can be removed by carefully prising off with a pair of thin bladed screwdrivers or similar.

7 When refitting the fresh air nozzles, note the differences between left and right. This also applies to the hoses.

8 Fit the hose in position first, initially sliding it over the bent-up edge of the bulkhead. Make sure that the seal is securely fitted all round.

9 Now fit the nozzle and again make sure that the seal is intact. If the spring clips are damaged they should be renewed. Guide the hose as necessary until the seal on the nozzle is over the hose outlet.

## 11 Radiator - removing and refitting

1 Initially drain the radiator coolant as described earlier in this Chapter.

2 Loosen the hose clip at the top of the radiator and pull off the hose.

3 Remove the hexagon headed screw on the stay which is connected to the cowl. Slacken the nut at the other end then swing the stay out of the way.

4 Remove the bottom hose connection at the base of the radiator.

5 Unscrew the nut on the bottom rubber bearing bracket. Note that a flat washer and spring washer are fitted.

6 Now slacken the nut on the rubber bearing which is half way up the radiator on the engine side. Do not lose the large washer.

7 Lift out the radiator, complete with the cowl.

8 The cowl is fitted to the radiator with six hexagon headed screws, spring and flat washers. These can now all be removed.

9 With the radiator removed, any necessary repairs can be carried out. Although in some cases a cracked radiator can satisfactorily be repaired using a resin binding material such as Cataloy, it is generally more satisfactory to solder it. If you have not got the facilities at hand a well equipped garage will repair it at moderate cost.

10 Use an air line to blow the grease and dirt from the air passages. If this is not available a stiff brittle paint brush can be used.

11 It is a good idea to flush through the radiator with a hose pipe while it is out of the car, to remove any sludge deposits.

12 When the cowl is to be refitted to the radiator check that the rubber buffer strips are intact.

13 The radiator and cowl can now be refitted to the car in the reverse order to removal.

14 Finally check that the rubber seal of the fan cover is correctly fitted all the way round the circumference of the lip on the cowl.

## 12 Fan - removing and refitting

1 Loosen the two hexagon headed screws which secure the air guide ring to the fan support, then remove the fan belt.

2 Take out the three screws at the other end of the fan support then move the fan and support away from the engine and out of the engine compartment.

3 The fan can be removed by folding back the three tabs on the washer and removing the three screws. The fan can now be pulled off. When replacing it is important that a new tab washer is used.

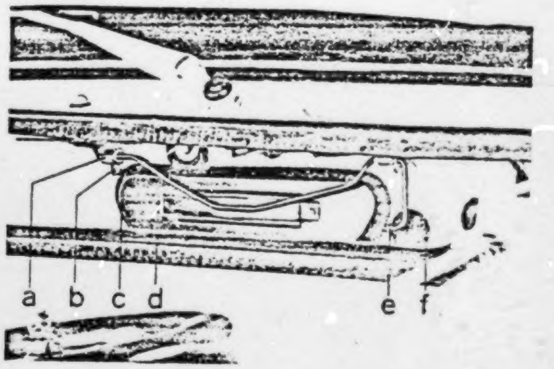

FIG. 2.19. FRESH AIR FLAP (SEC. 10)

*a* = *Fresh air flap bearing*
*b* = *Self tapping screw*
*c* = *Flap seal*
*d* = *Fresh air flap and bracket*
*e* = *Bowden cable and eyelet*
*f* = *Seal, Bowden cable*

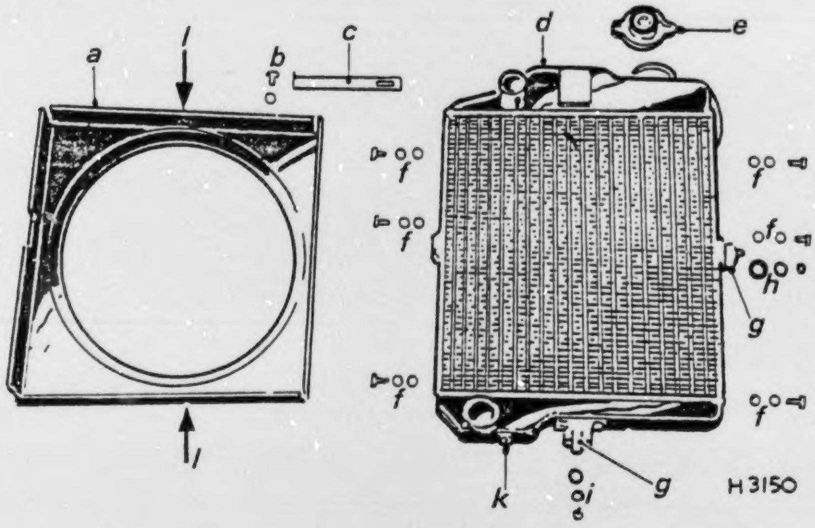

FIG. 2.20. THE RADIATOR (SEC. 11)

*a* = *Cowl*
*b* = *Hex. head screw*
*c* = *Strut*
*d* = *Radiator*
*e* = *Radiator cap*
*f* = *Hex. head screw*
*Spring washer*
*g* = *Rubber bearing*
*h* = *Hex. nut - washer*
*Spring washer*
*i* = *Hex. nut - washer*
*Spring washer*
*k* = *Coolant drain plug - seal*
*l* = *Sealing strips*

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| | | | | |
|---|---|---|---|---|
| Throttle gap ... ... | 1.6 ± 0.1 mm (0.063 ± 0.004 in.) | | 1.6 ± 0.1 mm (0.063 ± 0.004 in.) | |
| Bimetallic spring ... | 8 x 0.36 x 470 mm long | | 8 x 0.38 x 470 mm long | |
| Float needle valve ... | 2.0 | | 2.0 | |
| Float valve seal ... | 2 mm | | 2 mm | |
| Float weight ... ... | 7.3g | | 7.3g | |
| Float level ... ... | | | 15.5 to 17.5 mm (0.610 to 0.689 in.) | |
| CO content at idle ... | 1 ± 0.2% | | 4% since mid 1969, previously 4.5% | |
| Air passage jet, (throttle closed) ... ... | | 0130 to 0160 | | 0130 to 0160 |
| Opening tem. of thermo start valve *** ... | -5 to -10° C | | -5 to -10° C | |
| Outlet jet (throttle) *** | 1.4 mm | | 1.4 mm | |
| Air jet (cover) *** ... | 0.8 mm | | 0.8 mm | |
| Fuel jet (float chamber) *** | 1.1 ± 0.1 mm | | 1.0 mm | |

* Automatics
** X120 and 150 respectively, up to Engine No. ZZ 016 348
*** Starting aid

| Model | Audi 100LS Sweden (before 1972) | | Audi 100LS USA (before 1972) | |
|---|---|---|---|---|
| Carburettor type ... | Downdraught, two stage | | Downdraught, two stage | |
| Carburettor model and number ... ... | 32 TDID, E16629/E16646 * | | 32 TDID, E16240B | |
| | Stage 1 | Stage 2 | Stage 1 | Stage 2 |
| Venturi ... ... | 24 | 27 | 22 | 27 |
| Main jet ... ... | X125 | X145 | X102.5 | X140 |
| Air correction jet ... | 140 | 100 | 120 | 100 |
| Idle fuel jet ... ... | g50 (in cut-off valve) | 50 (idle reserve) | g47.5 (in cut-off valve) | 50 (idle reserve) |
| Idle air jet bore ... | 190 | 100 (idle reserve) | 130 | 100 (idle reserve) |
| Injection rate per stroke | 1.3 + 0.15 cc | | 'slow' min. 1.3 + 0.15 cc<br>'fast' 0.6 to 0.95 cc | |
| Choke gap ... ... | 3.0 ± 0.15 mm (0.118 ± 0.006 in.) | | 3.2 ± 0.2 mm (0.126 ± 0.008 in.) | |
| Throttle gap ... ... | 1.6 ± 0.1 mm (0.063 ± 0.004 in.) | | 1.4 ± 0.1 mm (0.055 ± 0.004 in.) | |
| Bimetallic spring ... | 8 x 0.36 x 470 mm long | | 8 x 0.36 x 470 mm long | |
| Float needle valve ... | 2.0 | | 2.0 | |
| Float valve seal ... | 2 mm | | 0.5 mm | |
| Float weight ... ... | 7.3g | | 7.3g | |
| Float level ... ... | 15.5 to 17.5 mm (-.610 to 0.689 in.) | | 14.0 ± 1 mm (0.551 ± 0.040 in.) | |
| CO content at idle ... | 1 ± 0.2% | | 1 ± 0.2% | |
| Air passage jet (throttle closed) ... ... | | 0130 to 0160 | | 0100 to 0130 |
| Opening temp. of thermo start valve *** ... | −5 to −10° C | | −5 to −10° C | |
| Outlet jet (throttle) *** | 1.4 mm | | 1.4 mm | |
| Air jet (cover) *** ... | 0.8 mm | | 0.8 mm | |
| Fuel jet (float chamber) *** | 1.1 + 0.1 mm (injection tube 45°) | | 1.0 mm (injection tube 50) | |

* Automatics
*** Starting aid

| Model | Audi 100LS Switzerland (before 1972) | | Audi 100LS Switzerland Automatic (before 1972) | |
|---|---|---|---|---|
| Carburettor type ... | Downdraught, two stage | | Downdraught, two stage | |
| Carburettor model and number ... ... | 32/35 TDID, E16279 | | 32/35 TDID, E16691 | |
| | Stage 1 | Stage 2 | Stage 1 | Stage 2 |
| Venturi ... ... | 24 | 27 | 24 | 28 |
| Main jet ... ... | X125 ** | X145 | X120 | X135 |
| Air correction jet ... | 160 ** | 100 | 130 | 100 |
| Idle fuel jet ... ... | g55 (in cut-off valve) | 50 (idle reserve) | g55 (in cut-off valve) | 50 (idle reserve) |
| Idle air jet bore ... | 140 | 100 (idle reserve) | 155 | 100 (idle reserve) |
| Injection rate per stroke | 1.8 ± 0.15 cc | | 1.6 ± 0.15 cc (slow) | |
| Choke gap ... ... | 2.8 ± 0.15 mm (0.110 ± 0.006 in.) | | 3.2 ± 0.15 mm (0.126 ± 0.006 in.) | |
| Throttle gap ... ... | 1.6 ± 0.1 mm (0.063 ± 0.004 in.) | | 1.6 ± 0.1 mm (0.063 ± 0.004 in.) | |
| Bimetallic spring ... | 8 x 0.36 x 470 mm long | | 8 x 0.36 x 470 mm long | |
| Float needle valve ... | 2.0 | | 2.0 | |
| Float valve seal ... | 2 mm | | 2 mm | |
| Float weight ... ... | 7.3g | | 7.3g | |
| Float level ... ... | 15.5 to 17.5 mm (0.610 to 0.689 in.) | | 15.5 to 17.5 mm (0.610 to 0.689 in.) | |
| CO content at idle ... | 4% since mid 1969, previously 4.5% | | 4% since mid 1969, previously 4.5% | |
| Air passage jet (throttle closed) ... ... | | 0130 to 0160 | | 0130 to 0160 |

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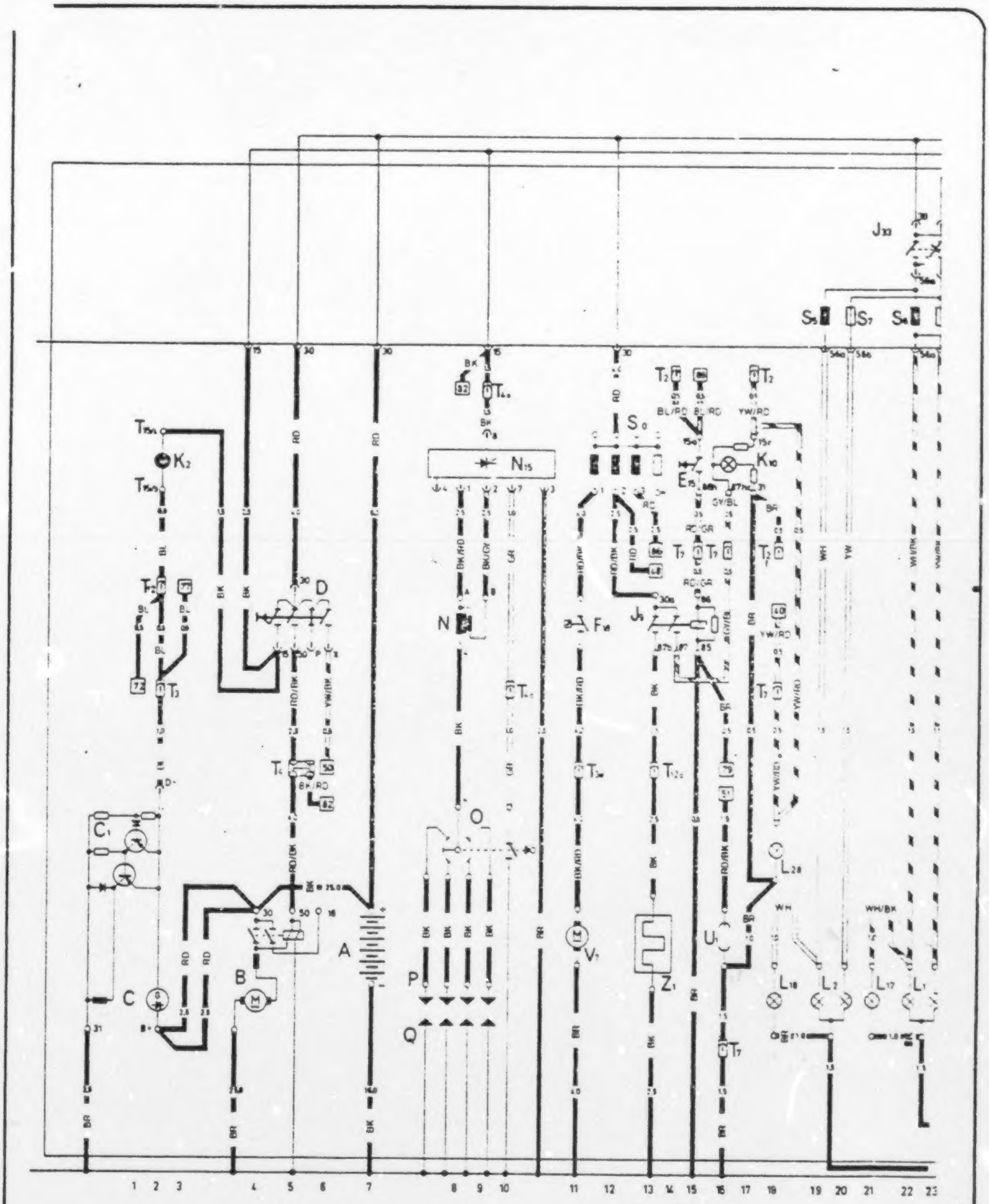
J10
S5
S7
S8
15
30
30
15
30
T2
T2
T2
BL/RD
BL/RD
YW/RD
S0
T15a
K2
T15b
N15
E15
K10
GY/BL
BK
BL
T2
T3
D
N
F18
J6
T1
T4
BK/RD
C1
O
L20
WH
WH/BK
RD
RD/BK
BK
A
B
C
V7
Z1
U
L10
L2
L17
L1
P
Q
T7
BR
31
1
2
3
4
5
6
7
8
9
10
11
12
13
14
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22
23

Fig. 13.63A Wiring diagram for 1976 USA models

Colour Code

Pink = PI
Black = BK
Brown = BR

Red = RD
Orange = OR
Yellow = YW

Green = GR
Blue = BL
Violet = VI

Grey = GY
White = WH
Purple = PU

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# Starters

## BOSCH

Alfa Romeo
Audi
BMW
Capri II (1976)
Mercedes-Benz
Porsche
Saab
Volkswagen
Volvo

### DESCRIPTION

Starter is a brush type, series wound, electric motor, equipped with an overrunning clutch (inner-wedge or outer-edge type). Unit may or may not be equipped with a solenoid. Field frame is enclosed by commutator end frame and drive bushing and carries the pole shoes and field coils. A spline, located on drive end of armature, carries overrunning clutch and pinion assembly. Armature shaft is supported in sintered bronze bushings in the commutator end frame and drive end housings (these bushings are packed with lubricant at assembly and require no further lubrication).

### APPLICATION

| Model | ①Bosch Part No. |
|---|---|
| Alfa Romeo | 311 110 |
| Audi | |
| 100LS | ②058 911 023A |
| Fox | ②056 911 023A |
| BMW | |
| 2002,2002A,2002tii | 311 016 |
| 3.0, 530i | 311 042 |
| Capri II (1976) | |
| 4 Cyl. | ③D5RY-B |
| V6 | ③D5RY-C |
| Mercedes-Benz | |
| 240D, 300D | ④002 151 3001 |
| All Others | ④002 151 3101 |
| Porsche | |
| 1.8 Liter | ⑤003 911 023A |
| 2.0 Liter | ⑤039 911 023 |
| 911 & Carerra Models | 312 100 |
| Saab 99 | 311 108 |
| Volkswagen | |
| Dasher,Rabbit,Scirocco | |
| Man. Trans. | 212 204 |
| Auto. Trans. | 212 206 |
| All Others | |
| Man. Trans. | 211 993 |
| Auto. Trans. | 212 005 |
| Volvo | |
| 4 Cylinder | 311 103 |
| 6 Cylinder | 311 027 |

① — Basic Bosch Part No. 0 001
② — Audi Part No.
③ — Ford Part No.
④ — Mercedes-Benz Part No.
⑤ — Porsche Part No.

### TESTING

**Lock Test** — Mount starter in a test stand to allow starter torque measurement (follow manufacturers instructions). With voltage adjusted to specifications, ammeter reading and starter torque should be within specifications.

**Free Running Test** — With starter in test bench (follow test manufacturers instructions), take readings of starter current, voltage and RPM. *NOTE — Starter must be mounted so as to prevent meshing of pinion and ring gear even in engaged position, also if starter has warmed up during previous tests, the RPM will be higher.*

### SPECIFICATIONS

**Brush Spring Tension**

| Application | Lbs. (Kg) |
|---|---|
| 208 XXX | 2.54-2.98 (1150-1350) |
| 211 XXX | 2.54-2.98 (1150-1350) |
| 211 9XX | 2.38-2.69 (1080-1220) |
| 212 XXX | 2.38-2.69 (1080-1220) |
| 311 XXX | 2.54-2.87 (1150-1300) |
| 312 1XX | 1.76-1.98 (800-900) |
| 313 XXX | 2.54-2.87 (1150-1300) |
| 362 XXX | 2.54-2.87 (1150-1300) |

**Min. Brush Length**

| Application | In. (mm) |
|---|---|
| 312 1XX | .394 (10) |
| 362 XXX | .611 (15.5) |
| All Other Starters | .512 (13) |

*NOTE — For performance test data, see specification table.*

### OVERHAUL

**DISASSEMBLY**

1) With starter removed from vehicle, remove dust cover (by removing retaining screws) or remove dust cover band and felt gasket. Lift out brush springs using a wire hook, pull out brushes to ¾ of their length. Remove screws connecting field coil terminals to brush boxes.

2) Disconnect field coil to solenoid strap, remove hex nut on one side of drive end cover and remove screw. Remove screws securing solenoid and remove solenoid. On mechanical starters, remove collar belt with cotter pin and washer.

3) Remove commutator end assembly (must be forced out if made of sheet metal), remove through bolts and pull complete drive end assembly forward. Take all washers off armature shaft, noting their proper location for reassembly.

4) If commutator end assembly was removed by unscrewing hex nuts, remove the threaded pins remaining, using hex nut and counter hex nut. Place this unit, consisting of drive end and armature, into a vise, after removing starter housing.

5) Remove yoke lever, then from armature shaft, remove cotter pin and left hand threaded castle nut. Remove snap ring using an aluminum or lead-jawed vise (to prevent damage to threads). Discard old snap ring. To prevent damage to bushing in drive end, be sure no burrs are left after removal of ring.

6) Remove drive assembly, intermediate bearing with bushing (if equipped) and armature brake, spring plate washer unit or washer spring jaw unit (depending on model).

**CLEANING & INSPECTING**

Wash all parts, except field coils and armature, in oil or carbontetrachloride. Field coils and armature may be cleaned in carbontetrachloride only. All parts must be dried immediately, using compressed air. Inspect all parts for wear or damage. Check all terminals for tight connections and good insulation. Lubricate polished surfaces (except commutator) with clean crankcase oil.

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## BOSCH (Cont.)

bushing, soak bushing in a suitable oil for not less than 30 minutes. After replacing, cross check inner diameter of bushing by pulling a smoothing mandrel through.

**REASSEMBLY**

*NOTE – When reassembling, use all new gaskets, and when reassembly complete, paint all main joints on starter (including solenoid) with gum-lac, or an equivalent.*

1) Clamp armature in a suitable holding fixture, line up armature brake unit and intermediate bearing. The bent ends of the spring plate washer unit must engage into holes of cupped washer of intermediate bearing.

2) Push drive over armature shaft, then push spring ring into groove (using suitable tool); use conical piece to force ring over after adjusting it with hex bolts, so that tube pushes spring ring straight into groove. Install castle nut and adjust with cotter pin.

3) Insert yoke lever, slipping drive end assembly over drive, being sure guide pins on fork are between guiding discs and that fork is in center of casting throat. Replace rubber seal to joint of drive end housing (on starters with intermediate bearing only).

4) Install intermediate bearing to drive end assembly and install through bolts in the reverse manner of their removal. Be certain intermediate bearing is properly seated to drive end assembly. Check armature brake spring ends to ensure proper positioning.

5) Insert armature, with drive end assembly into housing, do not damage field coils. Install washers on armature shaft as they were marked at disassembly, replace commutator end assembly. Check play of armature, this should not exceed .0029-.0118", adjust with shims if necessary.

6) Hook in joint fork of solenoid, pushing back engagement fork. Be certain rubber seal is installed between solenoid and drive end and copper washer on bearing bolt. Attach solenoid and field coil terminal to solenoid.

7) Connect field coil terminal to brush box and install brushes, making sure leads of brushes do not interfere with cover. Fasten dust cover, being certain to install gasket, bend tongues of lock washers.

**STARTER PERFORMANCE SPECIFICATIONS**

| Model | No Load Test | | Lock Test | | |
|---|---|---|---|---|---|
| | Amps. | RPM | Amps. | Volts | Torque |
| 208 XXX | 35-55 | 6000-8000 | 320-410 | 8.5 | 9 ft. lbs. |
| 211 XXX | 30-50 | 6000-9000 | 300-390 | 9.0 | 8.7 ft. lbs. |
| 211 9XX | 30-50 | 6500-9500 | 320-410 | 8.5 | 8.3 ft. lbs. |
| 212 XXX | 35-55 | 6000-8000 | 320-410 | 8.5 | 9 ft. lbs. |
| 311 XXX | 30-50 | 5500-7500 | 350-450 | 8.5 | 13 ft. lbs. |
| 312 1XX | 55-85 | 8500-10500 | 650-730 | 6.0 | 13.7 ft. lbs. |
| 313 XXX | 50-80 | 8300-10300 | 520-610 | 6.5 | 12.3 ft. lbs. |
| 362 XXX | 65-95 | 6500-8500 | 1100-1300 | 7.0 | 32.5 ft. lbs. |

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# Alternator Regulators

## S.E.V. MOTOROLA

Porsche
Renault
Volvo

### ▸ CHANGES, CAUTIONS, CORRECTIONS

▸ *SERVICE CAUTION – When servicing alternator or regulator, note following precautions to avoid damage to components:*

**Field Terminal** – Never ground field energizing terminal on alternator, regulator or connecting lead.

**Voltage Regulator** – Never operate voltage regulator without a good ground connection. Immediate damage will result.

**Alternator** – Do not ground output terminal. Always disconnect battery negative cable before removing wire from alternator output terminal. Do not attempt to polarize alternator as polarization is not required and any attempt to polarize will damage voltage regulator and wiring harness.

### DESCRIPTION

SEV Motorola alternators use either an electronic or mechanical type voltage regulator. The electronic unit contains neither mechanical contacts or relays, and requires no adjustments or maintenance. It is sealed, and if found to be defective requires replacement. The mechanical voltage regulator has fixed upper and lower contacts and the center contact is moveable.

### APPLICATION

| Model | Part No. |
|---|---|
| Porsche | |
| 911S & Carerra | 901 603 206 13 |
| Renault | 7700544686 |
| Volvo | |
| 6 Cyl. | 33544 |

### SPECIFICATIONS

| Model | Voltage Setting@77°F |
|---|---|
| Porsche | |
| Renault | 13.8-14.8 |
| Volvo | 13.1-14.4 |

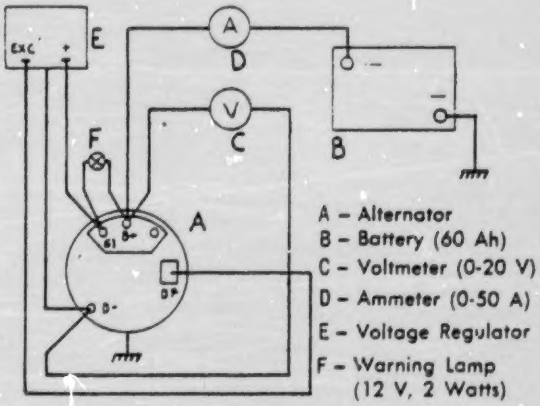

*Fig. 1 Regulator Test Circuit*

### TESTING

**ON CAR TEST**

1) Connect alternator and regulator as shown in illustration. For an accurate test, drive vehicle or operate system (on bench) for about 45 minutes at 30 miles per hour or more. This will allow regulator to reach its normal operating temperature.

2) Run alternator at 5000 RPM (engine speed - 2500 RPM) for 15 seconds. Voltage with no load should be as shown in specifications.

3) Load alternator with 10-15 amperes (for example, high beam headlights). Record voltage reading. The voltage should also be as shown in specifications.

4) For the Volvo regulator, the following chart gives voltage values for other ambient temperatures. If voltage is outside tolerance limits, regulator must be replaced.

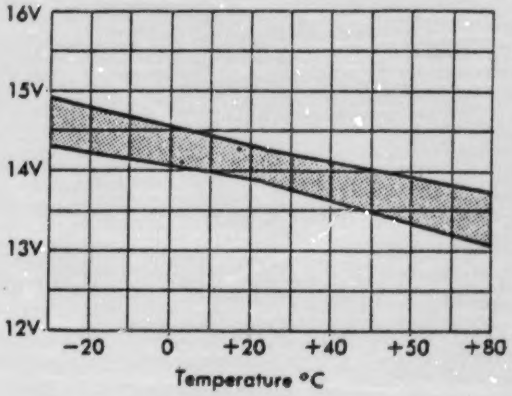

*Fig. 2 Voltage-Temperature Variation with Regulator Warm*

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# LABEL DIRECTIONS

# AND

# PARTS INSTRUCTIONS

## ANTI-FREEZE

Directions:

Never open a hot radiator!

1. Consult owner's manual for capacity and other information concerning your car's cooling system.
2. Set heater controls to maximum heat to open heater valve.
3. Drain and flush cooling system.
4. Fill radiator with clean water. Adjust flow to keep radiator full with drain cock open. Start engine and run for at least 10 minutes or until water drains clear. The top radiator hose must be hot. To flush engine block, the thermostat must be opened or removed.
5. Close drain cock.
6. Add desired amount of antifreeze. DO NOT PREMIX WITH WATER! Fill radiator to within 2-3 inches of the top. Start engine with radiator cap off and run until hot to fill heater and open thermostat.
7. Turn engine off. Fill radiator with clean water.
8. A solution of less than 40% or more than 70% antifreeze is not recommended.

CAUTION: Keep away from moving fan, belts, etc.

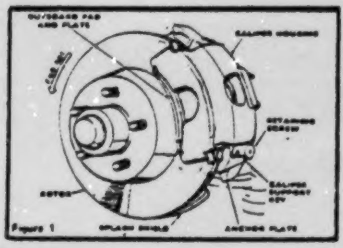
## DIRECTIONS ON A TUBE OF PRE-LUBE

Apply to all parts prior to assembly. Pre-Lube will adhere to parts and prevent damage from lack of lubrication. Also recommended for adding to gear boxes as an aid in reducing friction and to speed "break-in".

Add one ounce per pint or pound of lubricant.

# Installation Instructions

## Pad and Plate Replacement


OUTBOARD PAD AND PLATE
CALIPER HOUSING
RETAINING SCREW
CALIPER SUPPORT KEY
ROTOR
Figure 1
SPLASH SHIELD
ANCHOR PLATE

### PRELIMINARY STEP

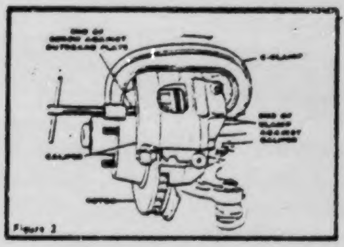
Siphon or dip part of brake fluid out of larger master cylinder reservoir (reservoir connected to disc brakes). Discard fluid removed.

### REMOVAL

1. Raise car, and remove wheel and tire assembly.
2. Place a large (8-inch) C-clamp on the caliper as illustrated in Figure 2, and tighten clamp to bottom piston in cylinder bore. Then remove clamp.
3. Use a ¼" Allen wrench to remove key retaining screw (Figure 1).
4. Use a drift and light hammer to drive out caliper support key and caliper support spring (Figure 3).

**NOTE:** It is not necessary to disconnect hydraulic line to caliper.

5. Remove caliper from anchor plate, and lay caliper on a tie rod or support strut. Do not let caliper hang with weight on brake hose.
6. Remove outboard pad and plate from caliper (Figure 4). It may be necessary to tap plate to loosen plate flange from caliper.
7. Remove inboard pad and plate from anchor (Figure 5). and remove anti-rattle clip from lower notch of anchor plate.


C-CLAMP
CALIPER
ROTOR
Figure 2

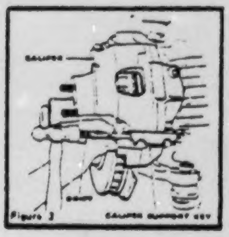
### CLEANING AND INSPECTION

Visually inspect caliper housing and area around dust boot for fluid leakage. If leakage is evident, overhaul the caliper.

Inspect anchor plate for defects, and replace anchor if defective.

**NOTE:** Normally the anchor plate mounting bolts should not be loosened unless the anchor is being replaced.

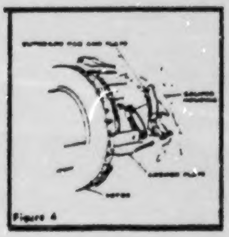
Use a wire brush to remove any rust or corrosion from machined surfaces of anchor and caliper. It is important to clean those areas of the caliper and anchor that are in contact during the sliding action of the caliper.


CALIPER
Figure 3
CALIPER SUPPORT KEY

### RE-INSTALLATION

1. Position anti-rattle clip in lower shoe notch in anchor plate (Figure 6). Be sure that clip is positioned with loop type spring away from rotor.
2. Position inboard pad and plate in anchor plate.
3. Be sure that caliper piston is fully bottomed in bore. If necessary, use a large C-clamp to assist.

**NOTE:** The service replacement outboard pad and plate has longer tabs than the pad and plate installed on new cars.


OUTBOARD PAD AND PLATE
ANCHOR PLATE
ROTOR
Figure 4

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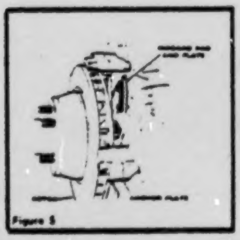
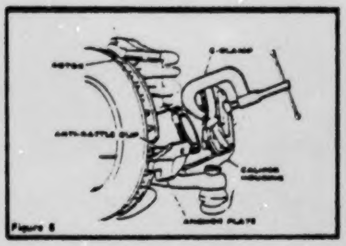


INBOARD PAD AND PLATE
ANCHOR PLATE

Figure 5



ROTOR
C-CLAMP
ANTI-RATTLE CLIP
CALIPER HOUSING
ANCHOR PLATE

Figure 6

4. Position outboard pad and plate on caliper, and use fingers to press plate tabs into place. If necessary, use a C-clamp as shown in Figure 6 to press plate into position. Be careful not to mar lining with C-clamp.

5. Position caliper in lower abutment of anchor plate as shown in Figure 7. Then insert a piece of thin cardboard between inboard plate and boot.

**NOTE:** The cardboard is to protect the dust boot when the caliper is rotated into position on the inboard pad and plate and the rotor; otherwise, the sharp edge on the inboard plate may damage the boot.

6. Rotate caliper downward over inboard plate and rotor, and remove cardboard.

7. Use a brake adjusting tool or screwdriver (Figure 8) to hold caliper in upper position in anchor plate. Then install caliper support spring and support key (Figure 9).

8. Use a soft (brass or plastic) mallet to drive key and spring assembly into position. Then install key retaining screw.

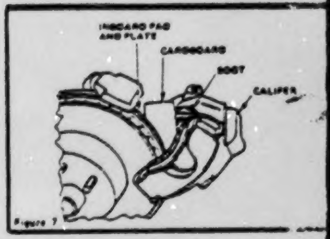
**FINAL CHECK**

After new pads and plates are installed on both front brakes, check master cylinder reservoirs, and fill, if necessary.

Depress brake pedal several times to seat pads against rotor.

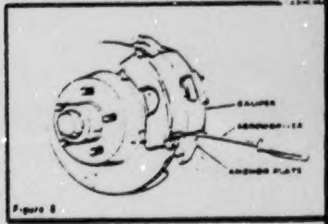
Re-check master cylinder reservoirs, and re-fill, if necessary.

**NOTE:** Bleeding should not be necessary; however, if pedal feels soft or mushy, bleed the hydraulic system.



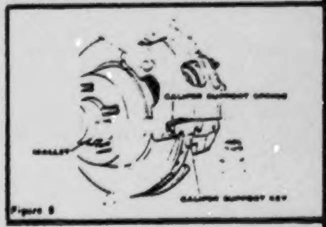
INBOARD PAD AND PLATE
CARDBOARD
BOOT
CALIPER

Figure 7



CALIPER
SCREWDRIVER
ANCHOR PLATE

Figure 8



CALIPER SUPPORT SPRING
MALLET
CALIPER SUPPORT KEY

Figure 9

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# INSTRUCTIONS FOR
# UTAH INSPECTION STATIONS

## SECTION I - REGISTRATION

The first step in the inspection of a vehicle should be a short review of the registration and the no-fault insurance papers. A vehicle can be inspected with out-of-state registration or with no registration.

| PROCEDURE | EQUIPMENT | ADVISE DRIVER | REJECT VEHICLE |
|---|---|---|---|
| A. AGREEMENT AMONG PAPERS<br>Inspect registration certificate, license plates, vehicle description and vehicle identification number. Compare to determine that there is proper agreement among them. If a vehicle is not registered some valid proof of ownership should be in evidence. |  | IF:<br>There are disagreements on the papers which are obviously accidental and clerical in nature. | IF:<br>Do not inspect the vehicle if the description or identification number is not in agreement with registration certificate. Numbers on license plates are not in agreement with numbers of registration certificate. |
| B. Check for No-Fault-Insurance |  | No written proof of No-Fault-Insurance is evident. |  |
| C. PLATE MOUNTING AND CONDITION<br>Inspect plates to see that they are securely mounted and are clean and clearly visible. |  | License plates are hanging loosely from their mounting brackets Plates are obscured so that numbers cannot be identified. |  |
| D. ODOMETER<br>Vehicle must be equipped with a properly functioning odometer. |  | Odometer is not functional or is disconnected |  |

## SECTION III SUSPENSION AND STEERING

LASH---TRAVEL

The steering system of the vehicle must be inspected to determine if excessive wear and/or maladjustment of the linkage and/or steering gear exists. Vehicle must be on a smooth, dry, level surface. On vehicles equipped with power steering, the engine must be running and the fluid level, belt tension must be adequate before testing. (fig. I).

| PROCEDURE | EQUIPMENT | ADVISE DRIVER | REJECT VEHICLE |
|---|---|---|---|
| A. LASH OR FREE PLAY (fig. 2)<br>With road wheels in straight ahead position turn steering wheel until the turning motion can be observed at the road wheels. Align a reference mark on steering wheel with mark on ruler and slowly turn wheel in opposite direction until front road wheel motion is again detected. Measure lash at steering wheel. | RULER | | IF:<br>Steering wheel movement exceeds:<br>Power - 2" (51 mm)<br>Manual- 3" (76 mm) |
| B. TRAVEL<br>Turn steering wheel through a full right and left turn and feel for binding, or jamming conditions. (On vehicles without power steering it may be desirable to unload front wheels slightly). | FLOOR JACK | | IF:<br>Front wheels are incapable of being turned to right and left design steering stops without binding or interference.<br>There is leakage in the hoses, valves, or seals.<br>Steering wheel is less than 13 inches in outside diameter and is not of circular construction. (ref, VESC 12 ) |

CHECK
FLUID LEVEL
BELT TENSION

Check the power steering system for leaks. Cracked or slipping belts.

FIGURE I

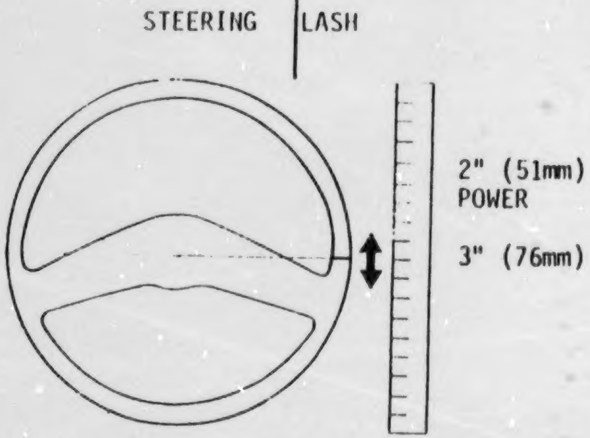
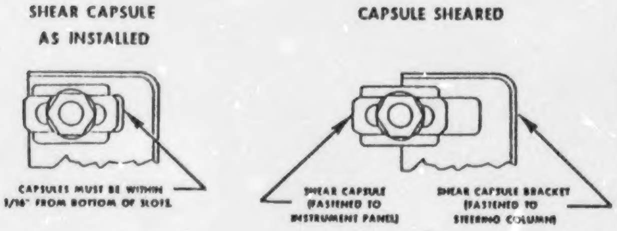


FIGURE II

ENERGY ABSORBING STEERING COLUMN - Many 1967 and all later model cars have been equipped with an Energy Absorbing Steering Column. This special column was designed to absorb energy by controlling the collapsing of its components. It collapses under impact from either end of the column - steering gear end and/or steering wheel end. To determine if the components are capable of functioning as designed, a careful inspection should be performed. (Fig. 3.)

| PROCEDURE | EQUIPMENT | ADVISE DRIVER | REJECT VEHICLE |
|---|---|---|---|
| Inside passenger compartment. | | | |
| C. Inspect for separation of shear capsule from bracket (See Fig. 3) and general "looseness" of wheel and column. | | | C. If shear capsule is separated from bracket, and/or if wheel and column can be moved as a unit. |
| | | | D. If adjustable steering wheel cannot be secured in a safe operating position. |

SHEAR CAPSULE SEPARATION


SHEAR CAPSULE AS INSTALLED
CAPSULE SHEARED
CAPSULES MUST BE WITHIN 1/16" FROM BOTTOM OF SLOTS
SHEAR CAPSULE (FASTENED TO INSTRUMENT PANEL)
SHEAR CAPSULE BRACKET (FASTENED TO STEERING COLUMN)

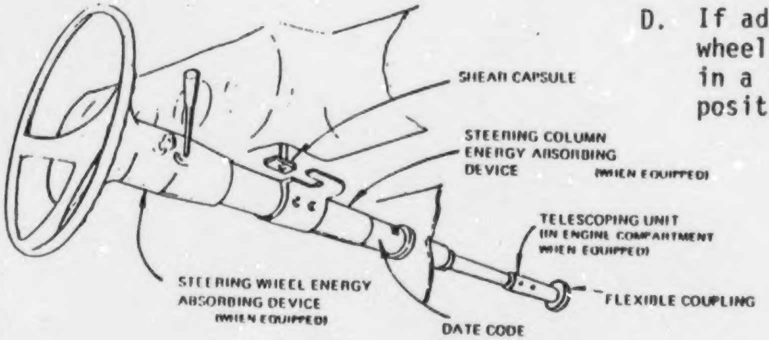

SHEAR CAPSULE
STEERING COLUMN ENERGY ABSORBING DEVICE (WHEN EQUIPPED)
TELESCOPING UNIT (IN ENGINE COMPARTMENT WHEN EQUIPPED)
FLEXIBLE COUPLING
STEERING WHEEL ENERGY ABSORBING DEVICE (WHEN EQUIPPED)
DATE CODE

Fig. 3

NOTE: There are too many variations of the energy absorbing column to be practically described in this Handbook. It is, therefore, suggested that a representative of the manufacturer be consulted in case of detailed questions. The system may include one or more of the four devices shown in Fig. 3, and the simplest to inspect is the shear capsule. Some models, however, do not have shear capsules, in which case C above would not apply.

## Appendix D
## Sample Data Sheet

Page 1 of 3

## CURRICULUM GROUP DATA SHEET

DATE Friday, December 10, 1982

FACILITATOR: Ron Wheadon

RECORDER: Louise Peterson

VIDEO TECH. Clyde Mead

AUTOMOTIVE SPECIALTY ENGINE REBUILD & SERVICE

COMPANIES REPRESENTED Dan Butz (Dave Strong Porsche/Audi); Truman Treglown, (Hayes Brothers Buick); Ed Anderson, (Beck Co.)

| DUTY: B. MAINTAIN AND REPAIR COOLING SYSTEMS. | RELATED MATHEMATICS | | | | | | RELATED READING | | | RELATED WRITING | | | RELATED LISTENING | | | RELATED SPEAKING | | | RELATED TOOLS & EQUIPMENT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TASKS: | Whole Numbers | Fractions | Decimals | Percents | Measurements | Practical Problems | Literal (Factual) | Interpretive | Critical | Mechanics | Using correct English | Composing | Literal (Factual) | Interpretive | Critical | Pronouncing and using lanuguage properly | Requesting and giving literal (factual) info | Explaining or describing | |
| 1. Check coolant freezing points and coolant temperatures | X | | | X | X | X | X | X | X | X | X | | X | X | X | X | X | X | |
| | Specific Use of Basic Skills: Measure quarts of anti-freeze | | | | | | Read and follow directions on bottle of anti-freeze | | | Write down work done | | | | | | make sense; explain what is being done. | | | |
| 2. Check overflow tanks and accessories. | X | | | | X | | X | X | X | X | X | | X | | | X | X | X | |
| | Specific Use of basic Skills: | | | | | | | | | Fill out work order. | | | | | | make sense; explain problem | | | |
| 3. Chemically clean and flush cooling systems. | X | | | | X | | X | X | X | X | X | | X | X | | X | X | | |
| | Specific Use of Basic Skills: measure chemicals | | | | | | read instructions on chemical bottle | | | make sense with abbreviations or descriptions of work done. | | | Receive instructions | | | Make sense; ask for info. | | | |
| 4. Inspect, adjust and replace fan belts. | X | X | | | X | | X | X | X | X | X | | X | X | | X | X | | |
| | Specific Use of Basic Skills: | | | | | | ability to read belt gauge | | | | | | hear whistle on belt | | | | | | |

## Appendix E
## Resumes of Report Developers

## CHARLOTTE BENAVIDEZ

### EDUCATION:

M.A. Linguistics/English as a Second Language, University of Utah, 1980
B.A. Secondary Education/English, University of South Carolina, 1966

### EXPERIENCE:

Teacher, Utah Technical College at Salt Lake/Skills Center
Pre-vocational and general English as a Second Language;
Auto Mechanics English for ESL students

Teacher, Salt Lake Community High School, Salt Lake City, UT
English as a Second Language for pre-literate adult refugees,
including materials development and course content

Teacher, Bilingual Education Program, Salt Lake City School District
English as a Second Language to bilingual (Spanish/English)
teachers

Teacher, Private Instruction, Madrid, Spain
English as a Second Language (Composition and pronounciation)

Teacher, English Language Institute, University of Utah, Salt Lake
English as a Second Language

### PROFESSIONAL ORGANIZATIONS:

Member, TESOL - Teachers of English to Speakers of Other Languages, and
I-TESOL - Intermountain Teachers of English to Speakers of Other Languages

### PRESENTATIONS:

"Teaching ESL to Pre-literate Adults", I-TESOL Conference, Logan, UT 1981

"Pre-Vocational ESL", Bilingual Conference, Utah State Board of Education, Salt Lake City, UT, September, 1982

### VOLUNTEER ACTIVITIES:

Member, Board of Directors, Big Brothers/Big Sisters of Salt Lake
Member, Training Committee, Utah Literacy and English as a Second Language Coalition

GEORGE MIYATAKE

## TECHNICAL EXPERIENCE

| | |
|---|---|
| 1966 - 1968 | EIMCO MACHINERY - Fabrication Mechanic<br>537 West 600 South, Salt Lake City, UT |
| 1968 - 1969 | WHEELER MACHINERY, INC. - Mechanic<br>300 West 2100 South, Salt Lake City, UT |
| 1976 - 1981 | BONNEVILLE ENGINE & AUTOMOTIVE REPAIR - Manager<br>170 South Redwood Road, Salt Lake City, UT |
| 1969 - 1976 | HEAVY-DUTY MECHANICS INSTRUCTOR<br>Salt Lake Skills Center<br>431 South 600 East, Salt Lake City, UT |
| 1976 - 1979 | FOREIGN AUTO INSTRUCTOR<br>Salt Lake Skills Center<br>431 South 600 East, Salt Lake City, UT |
| 1979 - current | ENGINE REBUILD INSTRUCTOR<br>Salt Lake Skills Center<br>431 South 600 East, Salt Lake City, UT |

## TECHNICAL EDUCATION

Gunnison Valley High School, Gunnison, UT
Snow College, Ephraim, UT
Utah State University, Logan, UT
University of Utah, Salt Lake City, UT